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TECHNICAL MEMORANDUM

DATE: March 12, 2024 Project No.: 1088-60-23-02

TO: Chad Davisson, General Manager
Graton Community Services District

FROM: Anne Girtz, PE RCE #91396

REVIEWED BY: Ryen Tarbet; Michael Zacharia, PE RCE #43225

SUBJECT: Graton Community Services District
Sanitary Sewer System Condition Assessment Technical Memorandum

INTRODUCTION

Graton Community Services District (District) is undertaking a project to assess the condition and plan for rehabilitation and repair of its sanitary sewer collection system.

This technical memorandum (TM) presents the methodology, results, and recommendations from the condition assessment that was performed on the District's sanitary sewer collection system, including gravity pipelines, manholes, and lift stations.

The following sections of this TM include:

- Background
- Existing System Description
- Condition Assessment Methodology, Results, and Repair & Rehabilitation Recommendations
  - Gravity Mains
  - Manholes
  - Lift Stations
- Next Steps

BACKGROUND

The District received a grant from the State Water Resources Control Board (Water Board) in March 2020 for planning, environmental, and design services for a project that would address deficiencies in the District sewer collection system (Agreement C-06-8335-110). The original scope of work included closed circuit television (CCTV) inspection of collection system infrastructure, a preliminary rehabilitation report, environmental documentation, federal Clean Water State Revolving Fund (CWSRF) funding application support for necessary improvements to the collection system, and 50-percent design and bid documents to support rehabilitation and repair of the collection system.

The Water Board issued an Amendment to the scope of the grant (Amendment No. 1) on June 9, 2023, which revised the scope and schedule of the project. Based on discussion with the District after issuance of Amendment No. 1, the scope of work was modified to expand collection system inspection efforts to include cleaning and inspection of all 32,000 feet of sewer line, inspection of 132 manholes, and inspection of the two collection system lift stations. To make the most efficient use of the available funding, the District agreed to move forward with the collection system condition assessment efforts in parallel with continuing discussions with Water Board staff regarding options for further modifications to the agreement. This includes discussing whether the total budget for the agreement can be increased so that all the planning efforts necessary to support the District's long-term goals can be completed.

This TM presents a summary of the condition assessment that was performed on the District's sanitary sewer collection system assets, including gravity mains, manholes, and lift stations. This document will be used to define the recommendations for the Preliminary Engineer's Report to be completed in a next phase of the project and used to support a construction grant application.

EXISTING SYSTEM DESCRIPTION

The District is located west of Santa Rosa, bounded by the Cities of Sebastopol to the south, Occidental to the west, and Forestville to the north. The District provides sanitary sewer collection, treatment, and disposal to a population of approximately 1,600 (2018) over a service area of approximately 43.1 acres. The sanitary sewer facilities are owned by the District.

The existing sanitary sewer collection system is made up of 112 manholes and approximately 7 miles of gravity pipeline, ranging from 6 to 12-inches in diameter (note that the actual length and extents of the collection system was greater than the length understood to exist during project scoping). Two lift stations convey flow from parts of the collection system to a trunk sewer on Ross Road, and then onto the District wastewater treatment facility, which is located at the north-westernmost part of the service area. The majority of the system (approximately 32,000 linear feet of gravity pipeline and the two lift stations) was constructed around 1976 and is now 48 years old. Development and system expansion after 1976 added approximately 5,000 linear feet of pipeline to the system. Most of the pipelines installed in 1976 are believed to be asbestos cement (AC) pipe; pipelines installed later are typically plastic (PVC, PE). Table 1 summarizes the gravity pipelines by diameter. The service area and collection system are presented in Figure 1.

Table 1. Sanitary Sewer Gravity Pipelines by Diameter

Pipe Diameter, inches	Length of Pipelines, ft	Length of Pipelines, miles	Percent of System
6	28,939	5.48	78%
8	3,444	0.65	9%
12	4,688	0.89	13%
Total	**37,071**	**7.02**	**100%**

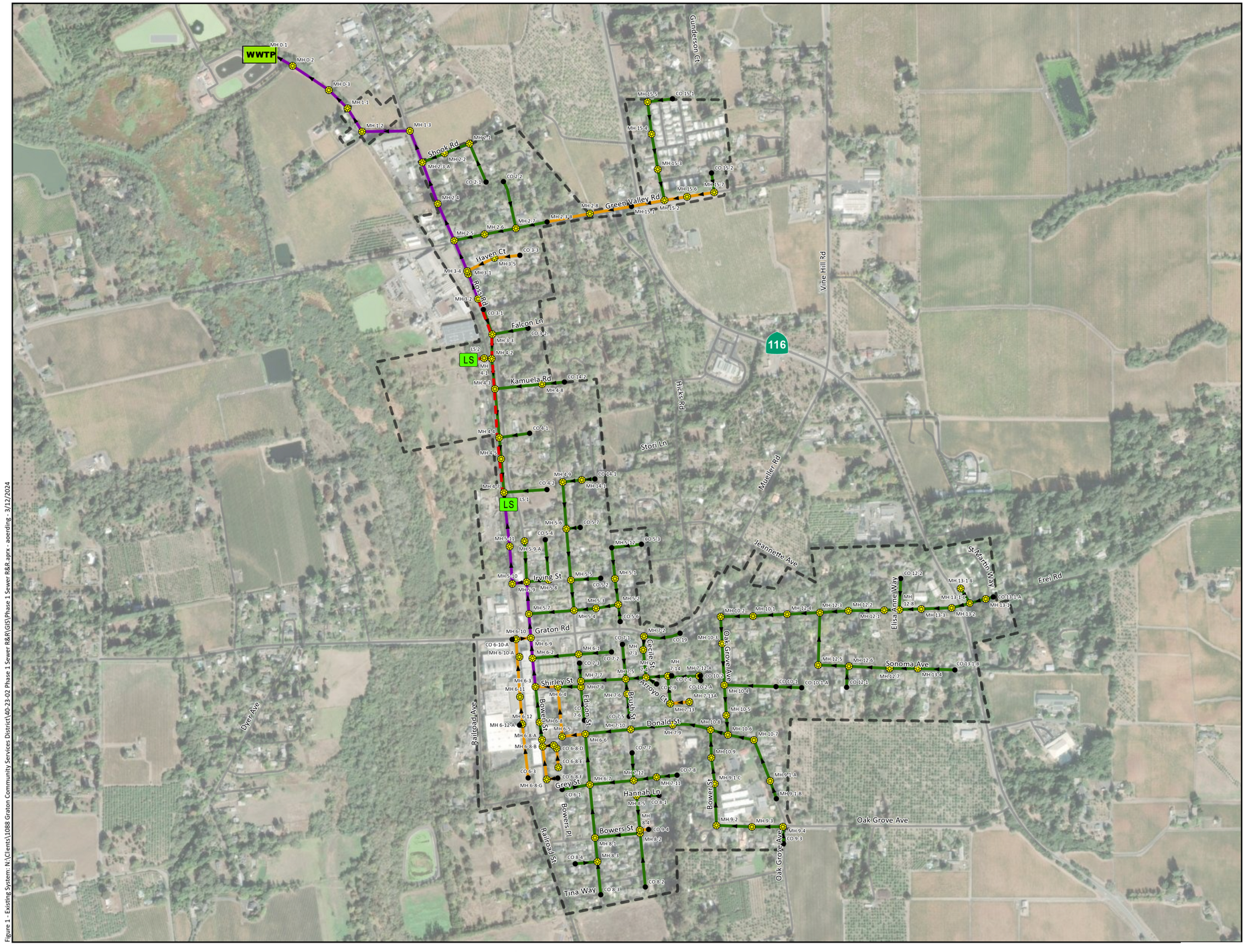

Figure 1 - Existing System: N:\Clients\1088 Graton Community Services District\40-23-02 Phase 1 Sewer R&R\GIS\Phase 1 Sewer R&R.aprx - aoerding - 3/12/2024

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0 1,200 Feet

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Sewer Rehab and Replacement Phase 1

GRATON community services district

Existing Wastewater Collection System

Figure 1

CONDITION ASSESSMENT METHODOLOGY AND RESULTS

This section presents the condition assessment methodology and results for gravity pipelines, manholes, and lift stations.

Map Digitizing and System Verification

Prior to beginning the condition assessment study, the District's existing system mapping was digitized into an ArcGIS online database and map. Existing mapping sources included two sets of PDF record drawings: *Improvement Plans of Graton Sewerage Facilities* (January 1976), and *Graton Community Services District Sewerage Collection System* (January 2010). The ArcGIS online database included spatial location of pipelines and manholes and associated asset attributes (e.g., size, material, installation date, etc.). A snip from the ArcGIS online map is presented in Figure 2. Once the map was prepared, field visits were performed to locate and geolocate manholes, and to verify the connectivity of the system. GPS coordinates of manholes were collected and used to update the ArcGIS online mapping. The field-verified ArcGIS online mapping became the basis for the pipeline and manhole inspections.

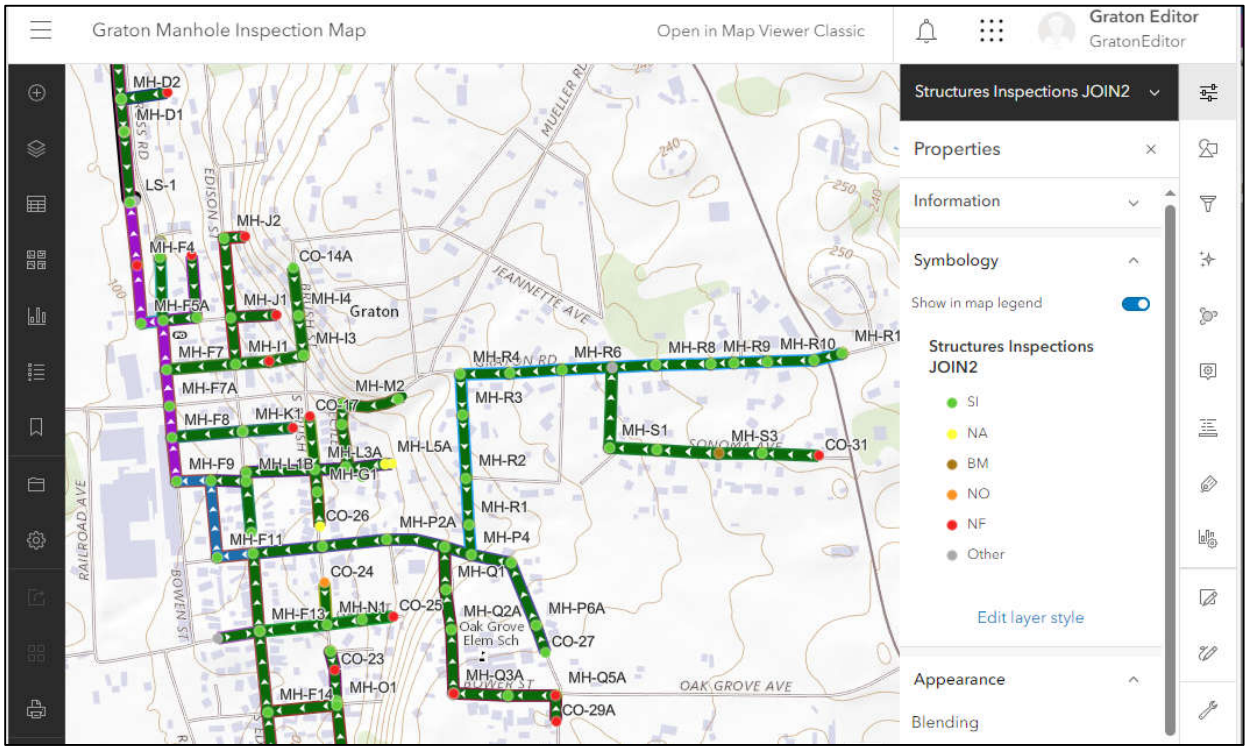


Figure 2. Graton CSD ArcGIS Online Map

Gravity Pipelines

Gravity pipelines were assessed using CCTV inspection. Inspections followed the National Association of Sewer System Companies (NASSCO) Pipeline Assessment Certification Program (PACP) assessment standards.

Inspection

CCTV inspections were performed by Miksis Services Inc. (MSI) in September and November 2023, and February 2024. All pipelines were hydro-jetted prior to inspection to remove debris. Table 2 presents a summary of the CCTV inspection status.

Table 2. Pipeline CCTV Inspection Status

Inspection Status	Count of Pipelines	Length of Pipelines, ft	Length of Pipelines, miles	Percent of System
Complete Inspection	128	29,791	5.64	81%
Partial Inspection - Complete for assessment purposes	18	4,957	0.94	13%
No Inspection Possible (No Access)	13	2,323	0.44	6%
Total	**159**	**37,071**	**7.02**	**100%**

As presented in Table 2, full CCTV inspections were completed for 81 percent of the system. Partial inspections were completed for 13 percent of the system; partial inspections are defined an inspection that provides information adequate for condition assessment and rehabilitation planning purposes. For example, if an offset joint defect in a pipe does not allow the CCTV camera to pass, it can be concluded that the pipe requires rehabilitation without a complete inspection. In these cases, additional inspection may be specified during construction. The remaining 6 percent of the system was not inspected; this was due to access issues (e.g., the only access was cleanouts, the manhole lid was corroded shut, etc.).

Condition Assessment

The CCTV inspections were used to assess the pipelines according to NASSCO's PACP standards. PACP classifies pipe defects as either structural or operation and maintenance (O&M) related. Structural defects provide an indication of the condition and structural degradation of the pipe, and include defects such as holes, cracks, breaks, and fractures. O&M defects provide an indication of the operational condition of the pipe and are related to maintenance issues such as deposits (grease, sediment), roots, or inflow and infiltration (I&I). All identified defects are assigned a corresponding defect grade based on their risk of further deterioration or failure (from least severe – Grade 1, to most severe – Grade 5). Defect Grade severity definitions for structural and O&M defects are presented in Table 3. Further, each pipe is assigned an overall structural and O&M Grade between 1-5 based on the maximum Grade defect observed.

Table 3. PACP Defect Grade Definitions[1]	
Defect Grade	Definition
Grade 5	Pipe segment has failed or will likely fail within the next five years - requires immediate attention. Pipe segment has more than thirty percent (by pipe area) of flow restricted.
Grade 4	Pipe segment has severe defects - risk of failure within the next five to ten years. Pipe segment has between twenty to thirty percent of flow restricted.
Grade 3	Pipe segment has moderate defects - deterioration may continue, at a ten to twenty-year timeframe. Pipe segment has between ten and twenty percent of flow restricted.
Grade 2	Pipe segment has minor defects - pipe unlikely to fail for at least 20 years. Pipe segment has less than ten percent of flow restricted.
Grade 1	Pipe segment has minor defects - failure unlikely in the foreseeable future.

Results

Tables 4 and 5 present a summary of the pipeline condition assessment results by PACP structural or O&M defect Grade. Thirty seven percent of assessed pipelines have no structural defects. Approximately 51 percent of assessed pipelines have Grade 3 or higher structural defects. The most prevalent structural defects are offset joints, broken pipes, and cracks. Photos of some structural defects are shown on the following page. Figure 3 presents the structural condition of the pipelines, with each pipe symbolized by its maximum structural defect Grade.

Table 4. Pipeline Condition Assessment Summary – Structural Defects			
Maximum Structural Defect Grade	Count of Pipelines	Length of Pipelines, feet	Percent by Length
Grade 5	12	3,219	9%
Grade 4	19	5,152	14%
Grade 3	40	10,564	28%
Grade 2	7	1,885	5%
Grade 1	1	303	1%
No Structural Defects	67	13,624	37%
No Inspection Possible (No Access)	13	2,323	6%
Total	**159**	**37,071**	**100%**

[1] Condition Assessment of Underground Pipes, U.S. EPA Water Infrastructure Outreach, 2015

Photo 1.
Offset Joint - Large (camera rotated 90° clockwise)

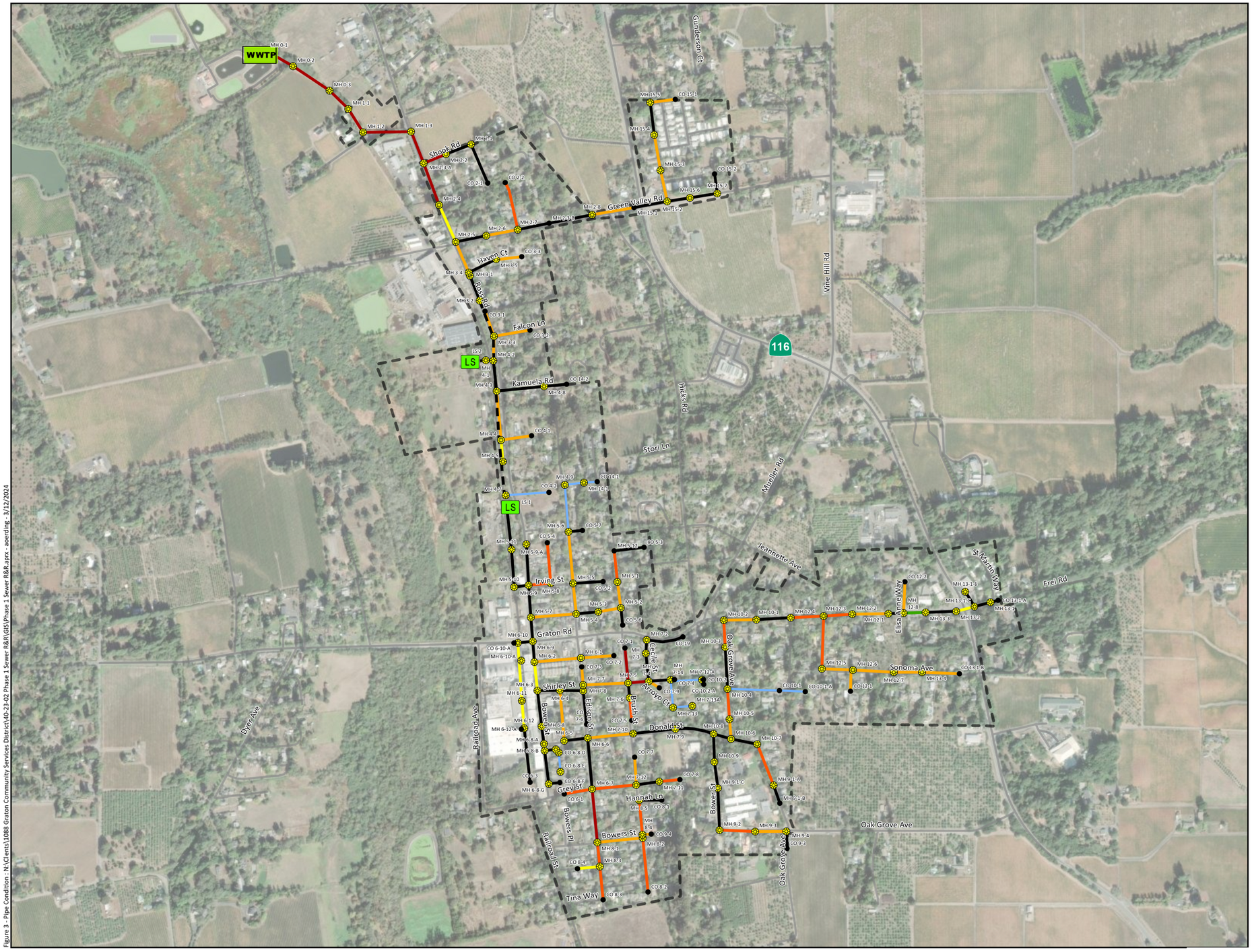
Photo 2.
Offset Joint - Large

Photo 3.
Hole/Broken with Voids Visible

Seventy three percent of assessed pipelines have no O&M defects. The most prevalent O&M defects are deposits and roots. Overall, the collection system has few O&M defects. A summary of all observed pipeline defect details and PACP defect codes are provided in Attachment A – Pipeline Database.

Table 5. Pipeline Condition Assessment Summary – O&M Defects

Maximum O&M Defect Grade	Count of Pipelines	Length of Pipelines, feet	Percent by Length
Grade 5	3	864	2%
Grade 4	7	1,816	5%
Grade 3	4	1,369	4%
Grade 2	9	2,392	6%
Grade 1	5	1,312	4%
No O&M Defects	118	26,995	73%
No Inspection Possible (No Access)	13	2,323	6%
Total	**159**	**37,071**	**100%**



Service Area

WWTP Wastewater Treatment Plant

LS Lift Station

Manhole

Cleanout

Force main

Maximum PACP Structural Defect Grade

5

4

3

2

1

0 (No Defects)

Unknown - No Inspection Possible

Figure 3 - Pipe Condition - N:\Clients\1088 Graton Community Services District\40-23-02 Phase 1 Sewer R&R\GIS\Phase 1 Sewer R&R.aprx - aoerding - 3/12/2024

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Pipeline Structural Condition

Figure 3

Rehabilitation and Repair Recommendations

Preliminary recommendations for rehabilitation and repair (R&R) were developed based on the pipeline condition assessment.

It is recommended that all PACP Grade 3 and higher defects be improved with a combination of R&R mitigation and improved maintenance efforts. These recommendations are consistent with industry best practices and the goals of the District to correct deficiencies in system, with a focus on reducing I&I. Table 6 presents a summary of potential R&R and maintenance actions.

Table 6. Potential R&R or Maintenance Actions

Action	Description	Suitable Defects, Criteria
R&R Action		
Cured-in-Place Pipe (CIPP)	CIPP lining is a rehabilitation technology that deploys an impermeable liner within the pipeline that is then expanded and cured to form to the pipe profile. The liner is chemically adhered to the pipe wall for a rigid, impervious liner installation, designed to perform as a complete structural pipe that does not rely on the host pipe for support. CIPP can be applied as an isolated repair, or a full pipeline repair.	• Suitable for non-protruding defects (cracks, holes) • Not suitable for offset joints • Isolated CIPP is suitable for defects <10ft in length
Excavate and Repair (Spot Repair or Full Replacement)	Excavate and repair involves open-cut trench excavation to expose the pipeline to either repair an isolated segment of the pipeline (spot repair) or the entire pipeline (full replacement). This is the most invasive technology requiring larger construction areas, trench shoring, and dewatering. Pipe bursting could also be used for full pipeline replacements, as pipe material and site constraints allow.	• Suitable for protruding defects and structural sags • Spot Repairs are suitable for defects covering <50% of the pipe length; for defects that cover >50% of pipe length, Full Replacement
Maintenance Action		
Heavy Cleaning	Cleaning efforts prior to CCTV included, at a minimum, two passes of hydrojetting. Heavy cleaning was performed in several locations to clear the pipe enough for inspection. Additional cleaning is required for pipes that were not able to be completely cleared/cleaned during the inspection. Increased maintenance cleaning frequency will reduce the buildup of debris that may limit hydraulic performance of the collection system.	• Suitable for debris, deposits, grease, encrustation
Root Removal	Root removal by mechanical (root cutting) or chemical (root foaming) means. Pipes with severe root intrusion may be CIPP lined after root removal to prevent future root issues.	• Suitable for roots

Based on the criteria in Table 6, each pipe with a structural or O&M defect of Grade 3 or higher was assigned a preliminary recommended R&R or maintenance action. Engineering judgment was also used to review and recommend other pipes for action. For example, a pipe with Grade 2 spalling throughout its entire length was recommended for CIPP rehabilitation; recommendations such as this are a conservative approach given the characteristics of these less severe defects and expected deterioration.

Recommended actions are summarized in Table 7 and presented in detail in Appendix A. Pipeline R&R recommendations are presented in Figure 4.

Table 7. Preliminary Pipeline R&R and Maintenance Recommendations

R&R Recommendation	Count of Pipelines	Length of Pipelines, feet	Percent by Length
Replacement	16	4,579	12%
Spot Repair(s)	42	11,195	30%
CIPP	12	3,540	10%
Maintenance Only	7	1,844	5%
No R&R Required	67	13,591	37%
Unknown - No Inspection Possible (No Access)	13	2,323	6%
Total	**159**	**37,071**	**100%**

Pipelines Not Inspected

R&R recommendations are unknown for 13 pipelines that were not able to be inspected. Consideration will be made during development of the detailed design documents to account for expected additional pipeline inspection, condition assessment, and R&R. This may include installation of manholes or raising manholes to grade to provide inspection access.

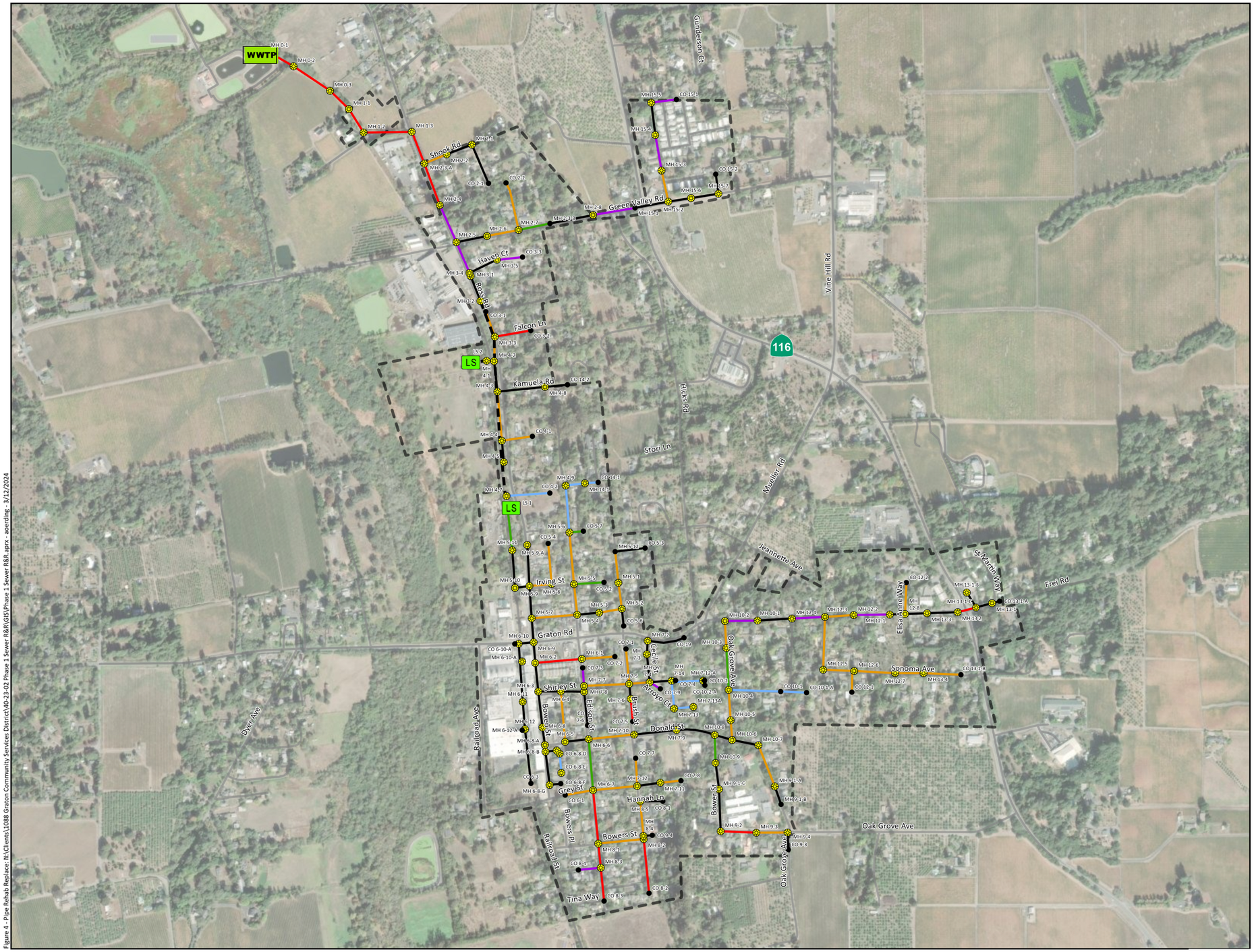

Figure 4 - Pipe Rehab Replace: N:\Clients\1088 Graton Community Services District\40-23-02 Phase 1 Sewer R&R\GIS\Phase 1 Sewer R&R.aprx - accerding - 3/12/2024

WWTP Wastewater Treatment Plant

LS Lift Station

Manhole

Cleanout

Force main

Pipeline R&R Recommendations

No R&R Required

Maintenance Only

Spot Repair

CIPP

Full Replacement

Unknown - No Inspection Possible

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Preliminary Pipeline R&R Recommendations

Figure 4

Manholes

Manhole inspection was performed according to the NASSCO Manhole Assessment Certification Program (MACP) Level 1 assessment standards which consists of a general visual assessment from the exterior of the manhole frame. This includes observation notations, and photographs of the manhole barrel, cover, and interior.

Inspection

Manhole inspections were performed by West Yost and SKL Solutions (SKL) from August 29, 2023 to February 2, 2024. Table 8 presents a summary of the manhole inspection status. Manhole inspections were completed for 85 percent of all manholes. Seventeen manholes were not inspected because they were either not found or were inaccessible.

Table 8. Manhole Inspection Status

Inspection Status	Count of Manholes	Percent of Total Manholes
Complete Inspection	95	85%
No Inspection Possible (Not Found)	13	12%
No Inspection Possible (No Access)	4	3%
Total	**112**	**100%**

Condition Assessment

The MACP Level 1 inspection rates the condition of seven manhole components including cover, frame, chimney, cone, wall, bench, and channel – see Figure 5. Ratings include: Sound (no defects, good condition); Broken (e.g. the manhole cover is broken and is in loose pieces, manhole ring is broken, or pieces of the manhole frame are missing); Defective (manhole component has visible structural or O&M Defects); or Corroded (manhole component shows signs of corrosion).

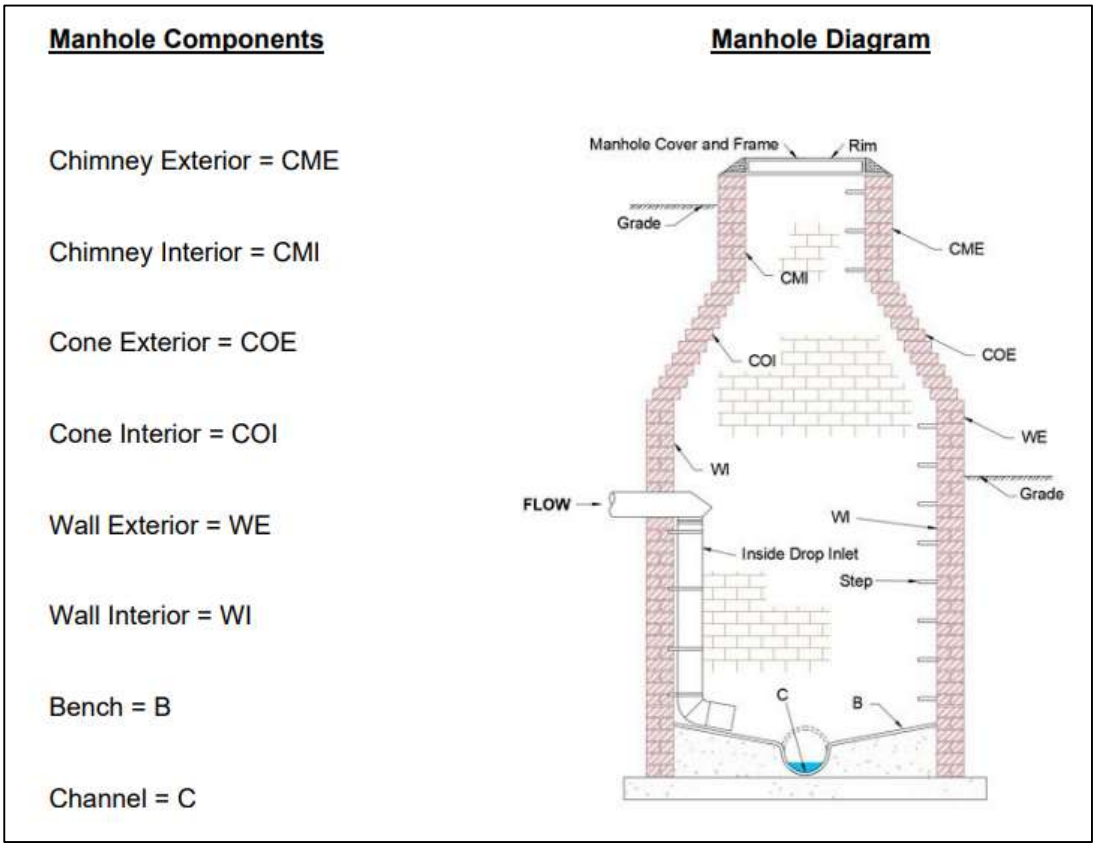

Figure 5. Manhole Component Diagram

Results

Table 9 presents a summary of the manhole condition assessment results, with component conditions ordered from most to least severe. Details on manhole defects are provided in Attachment B – Manhole Database.

63 percent of manholes have no defects. The most prevalent defect observed in manholes was corroded frames and covers. Many manholes (46) were observed to have infiltration staining. Other issues observed in the field, and not recorded in the standardized inspection included: Many manhole covers are slurry sealed-over and are very difficult to open; many manholes have their pick-holes plugged (assumed intentionally for I&I prevention) and are very difficult to open.

Table 9. Manhole Condition Assessment Summary

Component Condition and Quantity	Count of Manholes	Percent of Total Manholes
Broken or Cracked	0	0%
Defective or Corroded: Greater than 3 Components	6	5%
Defective or Corroded: 3 Components	2	2%
Defective or Corroded: 1 to 2 Components	17	15%
Sound (No Defects)	70	63%
No Assessment Possible (Not Found or No Access)	17	15%
Total	**112**	**100%**

Rehabilitation and Repair Recommendations

Based on the types and quantity of defects observed, it is recommended that manholes with three or more defective components (including both Defective and Corroded in Table 9) are replaced. Manholes with less than three defective components are recommended to be rehabilitated. Manholes with infiltration staining could also be considered for lining to reduce inflow and infiltration, based on priorities of the District.

Manhole rehabilitation can include manhole lining, grouting, reconstruction of channels, replacement of frame and cover, and other methods. The specific manhole rehabilitation method will be determined during the design phase based on detailed condition assessment information. Table 10 summarizes the preliminary manhole R&R recommendations. Manhole R&R recommendations are presented in Figure 6.

Table 10. Preliminary Manhole R&R Recommendations

R&R Recommendation	Count of Manholes	Percent of Total Manholes
Replacement	8	7%
Rehabilitation (Method to be determined in detailed design)	17	15%
No R&R Required[(a)]	70	63%
Unknown (Not Found or No Access)	17	15%
Total	**112**	**100%**

(a) Although these manholes do not require R&R, it is recommended the District consider a system-wide manhole rehabilitation program to reduce I&I and extend the life of manhole assets.

Manholes Not Inspected

R&R recommendations are unknown for 17 manholes that were not able to be inspected. Consideration will be made during development of the detailed design documents to account for expected additional manhole locating, inspection, condition assessment, and R&R.

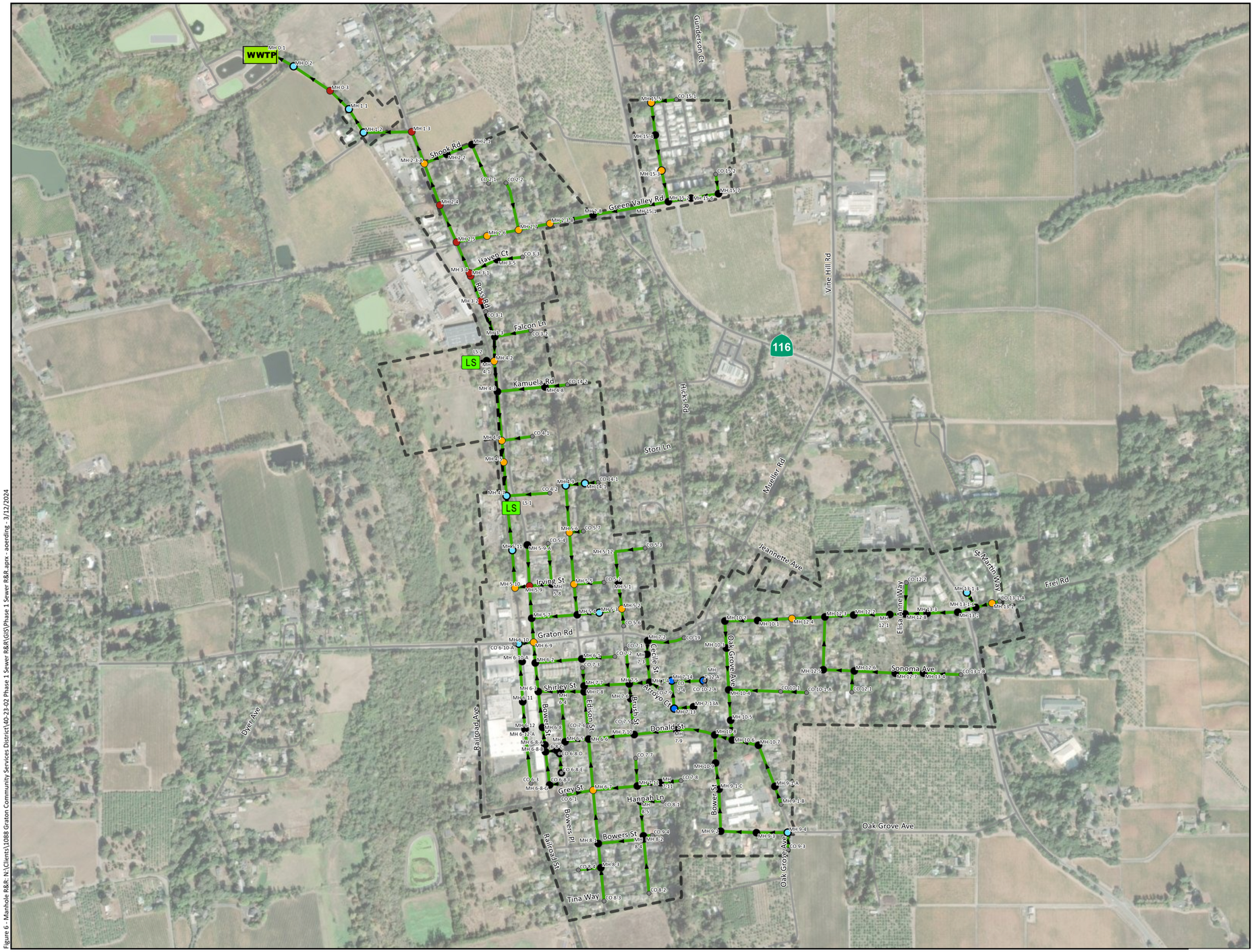

Figure 6 - Manhole R&R: N:\Client\11088 Graton Community Services District\40-23-02 Phase 1 Sewer R&R\GIS\Phase 1 Sewer R&R aprx - aoerding - 3/12/2024

WWTP Wastewater Treatment Plant

LS Lift Station

Gravity Main

Force Main

Manhole R&R Recommendations

- Replacement
- Rehabilitation (Method to be determined)
- No R&R Required
- Unknown - Not Found
- Unknown - Not Accessible
- Cleanout

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Sewer Rehab and Replacement Phase 1

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Preliminary Manhole R&R Recommendations

Figure 6

Lift Stations

The District owns and operates two lift stations. Lift Station 1 is a submersible pump station (two pumps) with a wet well and a single room electrical/generator building, located at 3400 Ross Road. Lift Station 1 collects wastewater from areas of town south of 3400 Ross Road and conveys flow via an 8-inch diameter, 1,700-ft long force main, discharging to a gravity sewer manhole on Ross Road just north of Falcon Lane. Lift Station 2 is a grinder submersible pump station (two pumps) in a wet well, located adjacent to 3820 Ross Road in a residential area. Lift Station 2 collects wastewater from the two adjacent residential lots and conveys flow via a 1.5-inch diameter, 130-ft long force main, discharging to a 6-inch gravity main which connects to the Ross Road sewer main. Both stations and force mains were originally constructed around 1976 and have had limited upgrades since.

Lift station condition assessments were conducted on August 21, 2023 by two West Yost engineers, escorted by John Gibson, the Chief Wastewater Treatment Plant Operator and Chad Davisson, District General Manager.

Condition assessment included visual inspection of major lift station assets such as pumps, wet well/drywell, inlet/outlet piping, and electrical/instrumentation. Operator feedback was collected to understand current operating and maintenance issues. Both a condition and performance score were assigned to assets on a scale of 1 to 5, with 5 indicating the worst condition or performance (see Table 11).

Table 11. Asset Condition Assessment Ratings

Rating	Description	Rating				
		1	2	3	4	5
Condition	Assesses the physical condition of the asset.	Excellent	Slight Visible Degradation	Visible Degradation	Integrity Moderately Compromised	Integrity Severely Compromised
Performance	Assesses the performance of the asset based on its intended function.	Functioning as intended	In service, but elevated O&M costs	In service, but function is moderately impaired	In Service, but Function is Highly Impaired	Not Functioning as Intended

Results and Recommendations

A summary of the condition assessment results and recommendations for lift stations are presented in Table 12 (Lift Station 1) and Table 13 (Lift Station 2). Photos of each station are included after each table. Priority replacements are indicated in the grey cells. Other recommendations would improve the operation, reliability, or access of the facilities but are second in priority.

Table 12. Lift Station 1 – Condition Assessment Results and Recommendations

Asset	Condition Rating	Performance Rating	Comments	Recommendations
Pump 1	5	5	Out of service, sent in for repairs/quote. Pumps are likely not operating at design capacity or incoming flow is greater than pumps are designed for.	Replace. New pump capacity should be based on future flow requirements. Consider adding additional (third) pump for backup.
Pump 2	5	5	Pump 2 was in service during the August 2023 inspection and rated a 3 for Condition and Performance. In February 2024, District staff notified West Yost that Pump 2 had since failed. Pumps are likely not operating at design capacity or incoming flow is greater than pumps are designed for.	Replace. New pump capacity should be based on future flow requirements. Consider adding additional (third) pump for backup.
Pump Guide Rails	3	3	Pumps are mounted on a bracket adapter to work with the guide rails. Guide rails are not standard width. See Photo 1 below.	Replace guide rails with standard width the next time major work is completed on pumps and wet well is taken out of service.
Wet Well	1	1	Cleaned and vactored every year. Wet well is in good structural condition. See Photo 1 below.	None
Wet Well Lid	3	1	Minor corrosion; 1 of 4 support brackets gone due to chains hanging on them; chains have since been moved. Hatch does not contain safety grate or spring assist mechanism for opening the hatch.	Replace or modify hatch to add safety grate and spring assist opening mechanism.
Discharge piping in wet well	4	3	Corrosion along entire section. See Photo 1 below.	Replace
Water Service Well	3	1	Well on site, shared ownership with neighbor	None
Valve Vault	2	1	Concrete and grates in good condition; minor build up of sediment/debris in bottom of vault.	None
6-inch Plug Valve (x2)	3	1	Minor corrosion on valve body and major corrosion on bolts. Functionality of valves is unknown; due to potential risk of damaging valves and age, recommend replacing valves.	Replace
6-inch Check Valve (x2)	3	1	Minor corrosion on valve body and major corrosion on bolts. Due to age, recommend replacing valves.	Replace
Hoist	2	3	Rust on bolts, otherwise in good condition. Portable hoist is unstable.	Consider installing more robust and permanent hoist.
Generator	4	3	Existing generator is not efficient and is obsolete; no parts available for repair and finding someone capable of work is difficult. See Photo 2 below.	Replace
Portable Bypass Pump	1	1	-	None
Site – yard, fencing, drainage	2	1	Chain-link fencing is in good shape but missing privacy slats. Recently extended and closed back of site due to vandalism of PG&E box	None
Access	2	1	Paved, and in good condition. See Photo 3 below.	None
Security	1	2	Gate around facility; locks on wet well access hatch, main gate, and structure gate/door. See Photo 3 below.	Consider installing more secure fencing and gate.
Structure	1	1	CMU and roof in good condition. Only repairs over years have been leakproofing, retaining walls also in good shape. Structure does not provide adequate access for generator repairs, clearance from electrical panels.	Consider replacing building to provide adequate clearance and access.
Electrical & Instrumentation/ Controls	3	2	General maintenance and housekeeping have been performed. Evidence of in-house modifications. No leak alarms, or on/off. Only alarms are high, lag pump, loss of air. All electrical/controls are original. Due to apparent age and modifications, all electrical, instrumentation, and controls assets/systems should be replaced.	Replace
Force Main	Not Inspected	Not Inspected	Useful life of sewer forcemains is 35-50 years. The forcemain is 48 years old and has no history of repair or rehabilitation.	Replace

Photo 4.
Lift Station 1 Wet Well

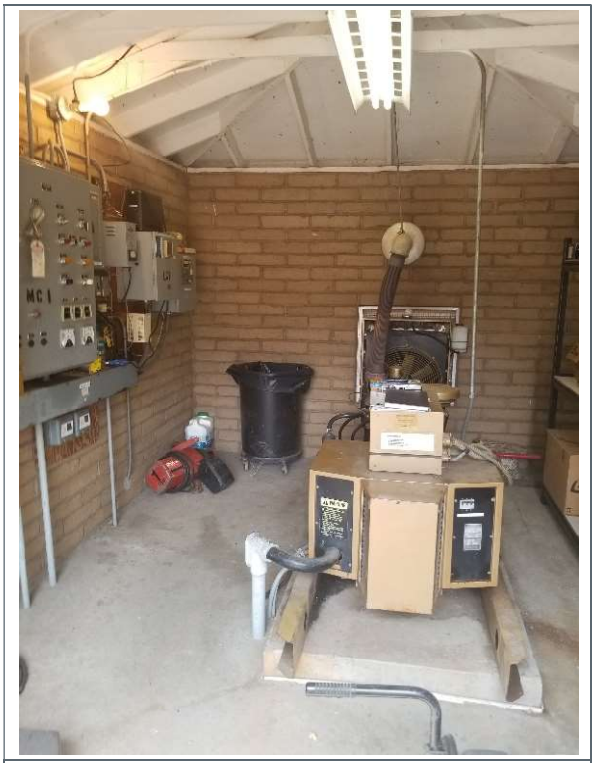

Photo 5.
Lift Station 1 Generator

Photo 6.
Lift Station 1 Site

Table 13. Lift Station 2 – Condition Assessment Results and Recommendations				
Asset	Condition Rating	Performance Rating	Comments	Recommendations
Overall	-	-	If the District is looking to handover this facility to others for ownership and management, consider replacing entire lift station with a package system (pumps and controls) that vendor can maintain; equip with cellular (not dial-up); and consider alarm package appropriate for residential management.	
Pump 1	1	1	Recently replaced	None
Pump 2	2	1	Performing fine	None
Pump Guide Rails	2	1	Good shape. Pumps are pulled by hand with a rope.	Install pulley system for pump access.
Check Valve	1	1	Recently replaced	None
1/2-inch Gate Valve (x2)	4	3	Corroded	None
Wet Well	2	1	Serves only 2 homes, takes a while to fill. See Photo 4 below.	None
Wet Well Lid	3	3	Recently DIY fabricated approx. 1 year ago; rusting.	None
Inlet MH	2	1	Rehabbed approx. 10 years ago	None
Outlet MH	4	2	Corrosion on effluent pipe elbow	None
Access	2	4	Dirt path, difficult to access with equipment due to property owner belongings. See Photo 7 below.	Improve site to allow for easier servicing and equipment access.
Security	1	1	Lock on electrical/control box	None
Meter/Control Housing	3	2	Corrosion along inside seals and bottom of box. See Photo 5 below.	None
Meter/Control Cabinet	1	1	In good shape, seals are good and no signs of corrosion. See Photo 5 below.	None
Electrical & Instrumentation/Controls	3	2	Seals on inner panel appear intact and components in acceptable condition. Outer enclosure is in corroded at bottom, potentially due to poor conduit seal from wet well instrumentation. See Photo 5 below. Due to apparent age and modifications, all electrical, instrumentation, and controls assets/systems should be replaced.	Replace. Evaluate conduit and seals from wet well to panel for leakage before re-using.
1.5” Forcemain (130 ft)	Not inspected	Not inspected	Useful life of sewer forcemains is 35-50 years. The forcemain is 48 years old and has no history of repair or rehabilitation.	Replace

Photo 7.
Lift Station 2 Wet Well

Photo 8.
Lift Station 2 Cabinet

Photo 9.
Lift Station 2 Site

Photo 10.
Lift Station 2 Access/Site

NEXT STEPS

This document will be used to define the final recommendations for the Preliminary Engineer's Report. The Preliminary Engineer's Report will be completed in the next phase of the project and used to support a construction grant application.

Attachment A

Pipeline Database

PACP Defect Codes

	MH ID		Pipe						CCTV Survey		PACP Assessment							Preliminary Pipeline Action(s)						
	U/S	D/S				Length							PACP Code and (Footage)					O&M Action				R&R Action		
Pipe ID	ID	ID	Dia	Mtl	Install Date	GIS	CCTV Survey	Need CCTV?	Inspection Date	Survey Direction	Structural QR	O&M QR	Grade 5	Grade 4	Grade 3	Grade 2	Grade 1	Maint. Needed?	Maint. Method	R&R Needed?	R&R Reason	Full Pipe Replace-ment	Rehab		Comment
																							CIPP	Spot Repair	
MH 7-12-A_To_Blind-T	MH 7-12-A	Blind-T	6		1976	98.2		Y																	
CO 10-1-A_To_CO 10-1	CO 10-1-A	CO 10-1	6		1976	246		Y																	
CO 6-8-E_To_CO 6-8-D	CO 6-8-E	CO 6-8-D	8		After 1976	130		Y																	COs upstream and downstream; bend at DS CO that is accessibe from further DS MH - not possible to get
MH 0-1_To_Headworks	MH 0-1	Headworks	12	CI	1976	73	73	N			5100	0000						N		Y	Grade 3+ Structural Defect; Unable to be Inspected due to Condition	X			Pipe not able to be inspected (headworks and DS inaccessible MH) but assumed to be in same poor condition as adjacent pipes
MH 5-11-A_To_LS-1	MH 5-11-A	LS-1	12	AC	1976	29	21.7	N	11/6/2023	Downstream	0000	0000						N		N					
MH 0-2_To_MH 0-1	MH 0-2	MH 0-1	12	AC	1976	246	246	N	12/5/2023	Downstream	5100	0000	SMW (0)					N		Y	Grade 3+ Structural Defect; Unable to be Inspected due to Condition	X			Assume full replacement
MH 0-3_To_MH 0-2	MH 0-3	MH 0-2	12	AC	1976	357	357	N	12/5/2023	Downstream	5100	0000	SMW (0)					N		Y	Grade 3+ Structural Defect; Unable to be Inspected due to Condition	X			Assume full replacement
MH 1-1_To_MH 0-3	MH 1-1	MH 0-3	12	AC	1976	205	205	N	12/5/2023	Downstream	5100	0000	SMW (0)					N		Y	Grade 3+ Structural Defect; Unable to be Inspected due to Condition	X			Assume full replacement
MH 12-4_To_MH 10-1	MH 12-4	MH 10-1	6	AC	1976	285.09523	270.8	N	10/19/2023	Downstream	0000	0000					Tap (65.8, 151.8, 156, 206.6, 220.6)	N		N					
MH 10-1_To_MH 10-2	MH 10-1	MH 10-2	6	AC/PVC	1976	263.47783	261	N	10/19/2023	Downstream	3221	0000			JOM (13.7, 226.4)	MWLS 30% (257)	MMC (13.7, 15.1, 226.4) Tap (14.9, 35, 125.5, 146.3, 197.1, 228.4, 237.7,)	N		Y	Grade 3+ Structural Defect		X		JOMs at taps/saddles; consider CIPP. Excavate may cause further settlement
MH 10-2_To_MH 10-3	MH 10-2	MH 10-3	6	AC	1976	209.32539	206.8	N	10/10/2023	Upstream	4100	0000		B (60.7)			TF (20, 40.4, 181.3)	N		Y	Grade 3+ Structural Defect			X	
CO 10-1_To_MH 10-4	CO 10-1	MH 10-4	6		1976	394		Y																	
MH 10-3_To_MH 10-4	MH 10-3	MH 10-4	6	AC	1976	340.17106	328	N	10/10/2023	Downstream	0000	3100			DAZ (233.1)		TF (49.4, 125.3, 197.3, 305.8)	Y	Heavy Cleaning	N					
MH 10-4_To_MH 10-5	MH 10-4	MH 10-5	6	AC	1976	242.85671	238.1	N	10/10/2023	Downstream	4133	0000		B (95.9)	JSM (164.4, 169.9) JOM (164.4)		TF (12.4, 68.8, 95.5, 151.8, 165.9, 233.8) MMC (164.4, 166.9)	N		Y	Grade 3+ Structural Defect			X	
MH 10-5_To_MH 10-6	MH 10-5	MH 10-6	6	AC	1976	159.39047	158.2	N	10/10/2023	Downstream	3400	4421		DAGS (70.6-91.7)	JOM (17.9) MWLS (70.6-91.7)	DAGS (61.2)	MMC (16.5, 18.4) TF (17.7)	Y	Heavy Cleaning	Y	Grade 3+ Structural Defect			X	
MH 10-7_To_MH 10-6	MH 10-7	MH 10-6	6		1976	221.87566	220.6	N	10/9/2023	Downstream	0000	1100					TF(7.1, 66.6), MMC (211.3), RPL(217.3)	N		N					
MH 9-1-A_To_MH 10-7	MH 9-1-A	MH 10-7	6		1976	352.15994	343.7	N	10/2/2023	Downstream	4112	0000		JOL(319.3)		FC (167.2)	TF(78.9, 161.2, 280.2 322.5), MMC (319.3, 325.2)	N		Y	Grade 3+ Structural Defect			X	Consider also CIPP for cracks
MH 10-6_To_MH 10-8	MH 10-6	MH 10-8	6		1976	133	142.6	N	10/9/2023	Downstream	0000	0000					TF(96.1)	N		N					
MH 10-9_To_MH 10-8	MH 10-9	MH 10-8	6		1976	171	212.7	N	10/2/2023	Downstream	0000	0000					RFJ(12.9, 22.6), TF(103.8, 212.6), MMC(212.6)	Y	Root Removal	N					
MH 9-1-C_To_MH 10-9	MH 9-1-C	MH 10-9	6		1976	238	207.5	N	10/2/2023	Downstream	0000	0000					TF(136.2)	N		N					
MH 1-2_To_MH 1-1	MH 1-2	MH 1-1	12	AC	1976	221	221	N	12/5/2023	Downstream	5100	0000	SMW (0)					N		Y	Grade 3+ Structural Defect; Unable to be Inspected due to Condition	X			Assume full replacement
MH 1-3_To_MH 1-2	MH 1-3	MH 1-2	12	AC	1976	388	388	N	12/5/2023	downstream	5100	0000	SMW (0)					N		Y	Grade 3+ Structural Defect; Unable to be Inspected due to Condition	X			Assume full replacement
MH 12-8_To_MH 12-1	MH 12-8	MH 12-1	6	AC	1976	122.6	123	N	10/19/2023	Downstream	0000	0000						N		N					
MH 12-1_To_MH 12-2	MH 12-1	MH 12-2	6	AC	1976	296.70429	286.2	N	10/19/2023	Downstream	3300	2200			JOM (194.7, 196.9, 268.6)	RF (194.7, 196.9)	Tap (105.4, 176.5, 196.1, 269.7) MMC (194.9, 196.9)	N		Y	Grade 3+ Structural Defect		X		2 of Taps are PVC saddles with JOMs and roots; replacing JOMs will address roots. CIPP or?
MH 12-2_To_MH 12-3	MH 12-2	MH 12-3	6	AC	1976	227.89366	227	N	10/19/2023	Downstream	4132	1100		JOL (227.1)	JOM (95.4) MWLS 50% (226.3-227)		Tap (66.7, 94.1, 182.8) VZ Worm (72.2)	N		Y	Grade 3+ Structural Defect			X	Not sure what is going on at R7; needs to be inspected from R7 end
MH 12-5_To_MH 12-3	MH 12-5	MH 12-3	6	AC	1976	424.71082	419.9	N	10/19/2023	Upstream	4132	0000		B (164.9)	JOM (274.4, 276.6)		Tap (63.3, 144.2, 185.2, 275.4, 286.1, 332.2, 408.4) MMC(274.4 - PVC, 276.6 - AC)	N		Y	Grade 3+ Structural Defect			X	Fix JOM (tap); CIPP for B
MH 12-3_To_MH 12-4	MH 12-3	MH 12-4	6	AC	1976	255.44777	263.2	N	10/19/2024	Downstream	4100	2100		B (53.1)	MWLS (14.8)	OBZ (74.2)	MWL (19.3, 211.2) Tap (14.8, 16.4, 123.2, 241.5)	Y	Heavy Cleaning (spoon)	Y	Grade 3+ Structural Defect		X		
MH 12-6_To_MH 12-5	MH 12-6	MH 12-5	6	AC	1976	248.99261	239	N	10/2/2023	Downstream	3100	0000			JOM (77.5)		MMC (77.5, 79.8) TF (79.8, 85.9, 110.8, 235.4)	N		Y	Grade 3+ Structural Defect			X	Excavate & Repair at 77.5 feet
CO 12-1_To_MH 12-6	CO 12-1	MH 12-6	6	PVC	After 1976	179	176.7	N	12/1/2023	Upstream	3122	2100			JOM (39.6)	MWLS 15% (103.1, 140.6)	MWL 5% (0, 107.1) Tap (104.4, 169.1, 171.7)	N		Y	Grade 3+ Structural Defect			X	Excavate & Repair at 39.6 ft
MH 12-7_To_MH 12-6	MH 12-7	MH 12-6	6	AC	1976	325.5189	315.4	N	10/2/2023	Downstream	3100	1100			JOM (289)		TF (35.7, 115.6, 290.7) MMC (289) TS (290.2) RFJ (290.7)	Y	Root Removal	Y	Grade 3+ Structural Defect			X	Excavate & Repair at 289 feet

	MH ID		Pipe						CCTV Survey		PACP Assessment							Preliminary Pipeline Action(s)							
	U/S	D/S				Length							PACP Code and (Footage)					O&M Action				R&R Action			
Pipe ID	ID	ID	Dia	Mtl	Install Date	GIS	CCTV Survey	Need CCTV?	Inspection Date	Survey Direction	Structural QR	O&M QR	Grade 5	Grade 4	Grade 3	Grade 2	Grade 1	Maint. Needed?	Maint. Method	R&R Needed?	R&R Reason	Full Pipe Replace-ment	Rehab		Comment
																							CIPP	Spot Repair	
MH 13-4_To_MH 12-7	MH 13-4	MH 12-7	6	AC	1976	239.17821	231.9	N	10/2/2023	Downstream	3521	5121	DAR (53.7)		JOM (2.5, 51.5, 97.7, 100.1, 202.9) RMJ (54.4)	MWLS [10%] (33.2) RTJ (151.1)	MMC (2.5, 6.6, 51.5, 203.1, 206.1) TF (4, 5.5, 49.1, 53, 98.9, 104.9, 151.1, 204.7) TFC (110.6) RFJ (47.2, 50)	Y	Root Removal and Heavy Cleaning	Y	Grade 3+ Structural Defect			X	Excavate & Repair at 2.5 and 51.5, 97.7, 100.1 and 202.9 feet.
CO 12-2_To_MH 12-8	CO 12-2	MH 12-8	6	PVC	After 1976	288	281.7	N	12/5/2023	Upstream	3121	1100			JOM (16.6)	MWLS 15% (20.3)	MWL 5% (33.8) MWL 15% (67.5) MMC AC (5) Tap (71.3, 74.2, 141.8, 209.8, 251.8, 254.7, 270.7, 273.7, 276.7) RFJ (274.5)	N		Y	Grade 3+ Structural Defect			X	Excavate & Repair at 16.6 ft
MH 13-3_To_MH 12-8	MH 13-3	MH 12-8	6	RCP	1976	303.1	176.3	N	10/19/2023	Downstream	1F00	0000					SSC (entire) Tap (80.3)	N		N					
MH 2-3-A_To_MH 1-3	MH 2-3-A	MH 1-3	12	CI	1976	272	272	N	12/5/2023	N/A	5100	0000	SMW (0)					N		Y	Grade 3+ Structural Defect; Unable to be Inspected due to Condition	X			Assume full replacement
CO 13-1-A_To_MH 13-1	CO 13-1-A	MH 13-1	6	PVC	1976	24.5	42.6	N	2/23/2024	Upstream	0000	0000					Tap (6.7, 33.5)	N		N					
MH 13-1_To_MH 13-1-C	MH 13-1	MH 13-1-C	6	AC	1976	52.9	125.5	N	2/23/2024	Downstream	0000	0000					MWL 5% (0) Tap (75.8,)	N		N					
MH 13-1-B_To_MH 13-1-C	MH 13-1-B	MH 13-1-C	6		1976	55.1	113.8	N	2/23/2024	Upstream	0000	0000						N		N					CCTV last 10' to mainline
MH 13-1-C_To_MH 13-2	MH 13-1-C	MH 13-2	6	AC	1976	296.68917	149.5	N	10/18/2023	Upstream	2100	4100		MCU (125.3)		MWLS [20%] (106.6)	TFC (132.4)	N		Y	Grade 3+ Structural Defect	X			
MH 13-2_To_MH 13-3	MH 13-2	MH 13-3	6		1976	240.19066	241	N	10/18/2023	Downstream	0000	0000					Taps (137, 177)	N		N					
CO 13-1-B_To_MH 13-4	CO 13-1-B	MH 13-4	6	AC	1976	288.59028	281.6	N	10/2/2023	Upstream	3100	3111			JOM (28.9) DSZ (139.2)		RFJ (29.4) MMC (29.5, 32.1) TF (30.6, 84.2, 148.8, 203.2, 272.9, 280.4)	Y	Root Removal and Heavy Cleaning	Y	Grade 3+ Structural Defect			X	Excavate & Repair at 28.9 feet.
CO 14-1_To_MH 14-1	CO 14-1	MH 14-1	6		1976	91		Y																	
MH 15-2_To_MH 15-1	MH 15-2	MH 15-1	6	PVC		341	320.5	N	10/17/2023	Downstream	0000	0000					MWL 5% (0) Tap (106.1) MMC to AC (131) MMC to DIP (140.8) MMC to PVC (274)	N		N					
MH 15-3_To_MH 15-2	MH 15-3	MH 15-2	6	PVC	After 1976	285	282.2	N	11/20/2023	Downstream	3100	0000			MWLS 30% (274-278)	MWLS 25% (274.9)	MWL 5% (280.1) Tap (2, 233.3)	N		Y	Grade 3+ Structural Defect			X	
MH 15-6_To_MH 15-2	MH 15-6	MH 15-2	8	PVC	After 1976	220	223.7	N	11/20/2023	Downstream	0000	0000						N		N					
MH 15-4_To_MH 15-3	MH 15-4	MH 15-3	6	PVC	After 1976	255	256.1	N	11/20/2023	Upstream	3322	0000			JOM (16.1) JSM (16.6, 36.5)	MWLS 20% (35.2, 146)	Tap (15.5, 46.1, 190.6) MWL 5% (41, 156.6)	N		Y	Grade 3+ Structural Defect		X		
MH 15-5_To_MH 15-4	MH 15-5	MH 15-4	6	PVC	After 1976	250	253.4	N	11/20/2023	Upstream	0000	0000					Tap (49.4, 95.2)	N		N					
CO 15-1_To_MH 15-5	CO 15-1	MH 15-5	6	PVC	After 1976	350	343.4	N	12/4/2023	Upstream	3300	4100			JSM (5.5, 138.5) MWLS 35% (29-39) MWLS 35-70% (335.4-340 [end])		MWL 5% (159) Tap (128.6, 239.2) MWL 35-70% (335.4-340) MCU (340.3)	N		Y	Grade 3+ Structural Defect		X		Excavate & Repair 29-39ft, and 335-350 ft; CIPP entire pipe
MH 15-7_To_MH 15-6	MH 15-7	MH 15-6	8	PVC	After 1976	201	198.7	N	11/20/2023	Downstream	0000	0000					Tap (68.6,	N		N					
CO 15-2_To_MH 15-7	CO 15-2	MH 15-7	6	PVC	After 1976	167	158.4	N	11/20/2023	Upstream	0000	0000					Tap (55.7, 152.5, 155.9)	N		N					
CO 2-1_To_MH 2-1	CO 2-1	MH 2-1	6		1976	337	312.8	N	10/16/2023	Upstream	0000	0000					Tap (91, 121.8, 142.5, 199, 203, 223.8, 306.5, 310.5)	N		N					
MH 2-1_To_MH 2-2	MH 2-1	MH 2-2	6		1976	198	215	N	10/16/2023	Downstream	0000	0000					Tap (88, 183)	N		N					
MH 2-2 _To_MH 2-3-A	MH 2-2	MH 2-3-A	6		1976	212	191	N	10/16/2023	Downstream	5100	0000	HSV (188)				Tap (80)	N		Y	Grade 3+ Structural Defect			X	
MH 2-4_To_MH 2-3-A	MH 2-4	MH 2-3-A	12		1976	347	350.1	N	12/5/2023	Downstream	5L2L	2100	HSV (105.9) SMW (entire)			OBZ (105.9) SSS (entire)	Tap (25, 105.9, 202.6, 280) ISSR (105.9)	N		Y	Grade 3+ Structural Defect	X			
MH 2-8_To_MH 2-3-B	MH 2-8	MH 2-3-B	6	PVC		352	346.7	N	10/17/2023	Downstream	0000	0000						N		N					
MH 2-5_To_MH 2-4	MH 2-5	MH 2-4	12		1976	331	338.8	N	12/5/2023	Downstream	2L00	2100				DAE (entire) SSS (entire)	Tap (98.2, 155.3, 157.3, 198.7)	Y	Heavy Cleaning	Y	Expected Future Deterioration		X		Likely going to deteriorate like downstream A-Line pipes. Consider heavy cleaning (cleaning may cause failures) and re-CCTV (to veritfy structural integrity, and CIPP), or just full replacement
MH 2-6_To_MH 2-5	MH 2-6	MH 2-5	6		1976	254	244.2	N	10/17/2023	Downstream	0000	0000					Tap(118.8)	N		N					
MH 3-4_To_MH 2-5	MH 3-4	MH 2-5	12	RCP		275	269.5	N	12/5/2023	Downstream	3100	2100			MWLS 50% (173-176) MWLS 30% (177-180)	DAE (entire) MWLS 20% (180-210)		Y	Heavy Cleaning	Y	Grade 3+ Structural Defect, Expected Future Deterioration		X		Likely going to deteriorate like downstream A-Line pipes. Consider heavy cleaning (cleaning may cause failures) and re-CCTV (to veritfy structural integrity, and CIPP), or just full replacement
MH 2-7_To_MH 2-6	MH 2-7	MH 2-6	6		1976	262	252.1	N	10/17/2023	Downstream	3100	0000			JOM(82.9)		Tap (87.3, 238.3)	N		Y	Grade 3+ Structural Defect			X	

	MH ID		Pipe						CCTV Survey		PACP Assessment							Preliminary Pipeline Action(s)							
	U/S	D/S				Length							PACP Code and (Footage)					O&M Action				R&R Action			
Pipe ID	ID	ID	Dia	Mtl	Install Date	GIS	CCTV Survey	Need CCTV?	Inspection Date	Survey Direction	Structural QR	O&M QR	Grade 5	Grade 4	Grade 3	Grade 2	Grade 1	Maint. Needed?	Maint. Method	R&R Needed?	R&R Reason	Full Pipe Replace-ment	Rehab		Comment
																							CIPP	Spot Repair	
CO 2-2_To_MH 2-7	CO 2-2	MH 2-7	6		1976	389	364.9	N	10/17/2023	Upstream	4113	0000		JSL(94.7)	JSM (93.3)		MMC (93.3, 94.7), Tap (94, 226, 239.9, 270.4, 287.6, 302.6, 364.9)	N		Y	Grade 3+ Structural Defect			X	
MH 2-3-B_To_MH 2-7	MH 2-3-B	MH 2-7	6		1976	234	253.5	N	10/17/2023	Downstream	0000	4100		RBL (2.6)			Tap (2.6, 112.3)	Y	Root Removal	N					
MH 15-1_To_MH 2-8	MH 15-1	MH 2-8	6	PVC		272.16	277.3	N	10/17/2023	Downstream	3200	0000			JSM (91.9, 215.5)		Tap (92.5, 255.4)	N		Y	Grade 3+ Structural Defect		X		
MH 3-2_To_MH 3-1	MH 3-2	MH 3-1	12	VCP	1976	228	228.2	N	12/5/2023	Upstream	0000	0000					MWL 20% (190.1) Tap (61.1)	N		N					
CO 3-1_To_MH 3-3	CO 3-1	MH 3-3	6		1976	216	205.4	N	10/12/2023	Upstream	3200	0000			JOM (177,181)		MMC (178, 181) TF (178, 179, 192, 203)	N		Y	Grade 3+ Structural Defect			X	
CO 3-2_To_MH 3-3	CO 3-2	MH 3-3	6		1976	290	287.3	N	10/12/2023	Upstream	3400	0000			JOM(38.6), JOM(40.8), JSM(64.8), JOM(79.5)		Tap(40.1, 80.4, 144.2, 151.6, 270.9, 284.7)	N		Y	Grade 3+ Structural Defect	X			
MH 3-1_To_MH 3-4	MH 3-1	MH 3-4	12	VCP	1976	302	24.7	N	12/5/2023	Downstream	0000	0000						N		N					
MH 3-5_To_MH 3-4	MH 3-5	MH 3-4	8		After 1976	262	257	N	11/20/2023	Downstream	0000	0000					Tap (26.5, 85, 127.9, 209.9, 224.2)	N		N					
CO 3-3_To_MH 3-5	CO 3-3	MH 3-5	8		After 1976	200	198.2	N	11/20/2023	Upstream	3100	0000			JSM (162.5)		Tap (50.9, 142.2, 172.9, 188.3, 189.7, 193.2)	N		Y	Grade 3+ Structural Defect		X		
MH 3-3_To_MH 4-2	MH 3-3	MH 4-2	6		1976	200	190	N	10/12/2023	Downstream	3121	0000			JSM (52)	MWLS 20% (96)	Tap (183)	N		Y	Grade 3+ Structural Defect			X	
MH 4-1_To_MH 4-2	MH 4-1	MH 4-2	6		1976	74.09164	59	N	10/12/2023	Upstream	0000	0000						N		N					
MH 4-2_To_MH 4-3	MH 4-2	MH 4-3	6		1976	231	240.2	N	10/12/2023	Downstream	0000	0000						N		N					
MH 4-8_To_MH 4-3	MH 4-8	MH 4-3	6		1976	385	355.3	N	10/12/2023	Upstream	0000	0000					Tap (76.4, 100.2, 231.2, 251.7, 351)	N		N					
CO 4-1_To_MH 4-4	CO 4-1	MH 4-4	6	AC	1976	253	236.5	N	10/16/2024	Upstream	3200	0000			JOM (7.8) JSM (95.6)		MWL 5% (0) Tap (94.5, 122.2, 231.2, 233, 234.6)	N		Y	Grade 3+ Structural Defect			X	
MH 4-3_To_MH 4-4	MH 4-3	MH 4-4	6		1976	374	383	N	10/12/2023	Downstream	3100	0000			JOM (63)		Tap (70, 269)	N		Y	Grade 3+ Structural Defect			X	
MH 4-4_To_MH 4-5	MH 4-4	MH 4-5	6		1976	168	167	N	10/16/2023	Downstream	2100	0000				MWLS 15% (132)		N		N					
CO 4-2_To_MH 4-7	CO 4-2	MH 4-7	6		1976	347		Y																	
CO 14-2_To_MH 4-8	CO 14-2	MH 4-8	6	PVC		145	145.1	N	2/22/2024	Upstream	0000	0000					Tap (5.9, 144.2)	N		N					
MH 14-1_To_MH 4-9	MH 14-1	MH 4-9	6		1976	171		Y																	
MH 5-12_To_MH 5-1	MH 5-12	MH 5-1	6		1976	174	250.9	N	10/10/2023	Downstream	4133	2311		JSL(244.1)	JSM(178), JOM (243.9), JOM (246)	RFJ(150.4), JOM (175.8), MMC (175.8), RFJ(178), RTJ (246)	Tap (81.3, 177, 245.3), RFJ (176.5), MMC (178, 243.9, 246)	Y	Root Removal	Y	Grade 3+ Structural Defect			X	
MH 5-9_To_MH 5-10	MH 5-9	MH 5-10	12	AC	1976	118	113.7	N	11/6/2023	Downstream	0000	0000				MWLS 25% (64-95)		N		N					
MH 5-10_To_MH 5-11	MH 5-10	MH 5-11	12	AC	1976	313	304.6	N	11/6/2023	Downstream	0000	0000					MWL 10% (0)	N		N					
MH 4-5_To_MH 5-11-A	MH 4-5	MH 5-11-A	6		1976	403	368.8	N	10/16/2023	Downstream	3100	0000			JSM(367)		MMC (89.1, 89.3, 367), Tap (89.3, 367.8), MGO(269.9)	N		Y	Grade 3+ Structural Defect			X	
MH 5-11_To_MH 5-11-A	MH 5-11	MH 5-11-A	12		1976	330	332	N	11/6/2023	Downstream	0000	3100			RMJ (297.8)		MWL 10% (0) MWL 25% (29.2) Tap (111.2) MMC to PVC (35.1)	Y	Root Removal	N					
CO 5-3_To_MH 5-12	CO 5-3	MH 5-12	6		After 1976	234	239.9	N	12/4/2023	Upstream	0000	0000					Tap (41.9, 43.2, 48.5, 115.9, 179, 197, 238.2, 239.9)	N		N					
CO 5-6_To_MH 5-2	CO 5-6	MH 5-2	6			60	56.2	N	12/1/2023	Upstream	0000	0000					Tap (2, 36, 55.9)	N		N					
MH 5-1_To_MH 5-2	MH 5-1	MH 5-2	6	AC	1976	203	207.1	N	12/1/2023	Downstream	3300	2200			JOM (51.8, 82.3, 202.6)	OBZ (53.6, 84.2)	MWL 5% (0) Tap (58.7, 85.1) MMC to PVC (51.8, 82.3) MMC to AC (53.6)	Y		Y	Grade 3+ Structural Defect			X	
MH 5-2_To_MH 5-3	MH 5-2	MH 5-3	6	AC	1976	366	365.8	N	2/22/2024	Downstream	3200	0000			JOM (??) (360.6, 365)		Tap (107.9, 148.9, 209.7, 229.3, 231.1, 300.5) MMC to PVC (228.2) MMC to CT (231.9)	N		Y	Grade 3+ Structural Defect			X	
MH 5-3_To_MH 5-4	MH 5-3	MH 5-4	6	AC	1976	175	184.2	N	10/11/2023	Upstream	0000	0000					TF(10.6, 86.6, 146.8, 177.2), TS(172.7)	N		N					
MH 5-5_To_MH 5-4	MH 5-5	MH 5-4	6		1976	253	240.4	N	10/11/2023	Downstream	3300	0000			JOM (111.1, 145.1), JSM(156.8)		TF(49.9, 112.8, 119.7, 146.2, 160.1,199.0), TFC(150.3), MMC (111.7, 113.4, 146.9, 198.0, 199.8),	N		Y	Grade 3+ Structural Defect			X	
CO 5-2_To_MH 5-5	CO 5-2	MH 5-5	6		1976	247	243	N	10/11/2023	Upstream	0000	4100		RBJ (243)			Tap (112.3, 174.5, 178.3, 242.3) MSA (243)	Y	Root Removal	N					
MH 5-6_To_MH 5-5	MH 5-6	MH 5-5	6		1976	417	412.1	N	10/11/2023	Upstream	3100	4100		DAZ(411.7) Concrete in pipe with block about 25%	JSM (23.9)		TF(128.9, 218.5, 347.2)	Y	Heavy Cleaning	Y	Grade 3+ Structural Defect			X	
CO 5-7_To_MH 5-6	CO 5-7	MH 5-6	6	AC	1976	113	108.9	N	10/11/2023	Upstream	0000	4100		RBL (108.9)			MWL 5% (0) Tap (108.9)	Y	Root Removal	N					
MH 4-9_To_MH 5-6	MH 4-9	MH 5-6	6		1976	382		Y																	
MH 5-4_To_MH 5-7	MH 5-4	MH 5-7	6		1976	370	359.6	N	10/11/2023	Downstream	3212	0000			JOM (193.2, 357.7)	CL(29.7)	TF(83.9, 94.5, 124.2, 165.2, 175.9, 181.5, 192.4, 196.5, 256.2, 273.3, 323.2), MMC (357.7)	N		Y	Grade 3+ Structural Defect			X	
MH 6-2_To_MH 6-9	MH 6-2	MH 6-9	12	AC	1976	165	164.5	N	11/6/2023	Downstream	0000	0000						N		N					
CO 5-4_To_MH 5-8	CO 5-4	MH 5-8	6		1976	331	322.4	N	10/11/2023	Upstream	4100	2200		B (319.2)		RTJ (319.2)	TF (72.4, 226.7, 276.6, 316.8, 319.6), TS (98.2), MMC (318.8, 320.5), RFL (98.2)	Y	Root Removal	Y	Grade 3+ Structural Defect			X	

	MH ID		Pipe					CCTV Survey		PACP Assessment							Preliminary Pipeline Action(s)							
	U/S	D/S				Length						PACP Code and (Footage)					O&M Action				R&R Action			
Pipe ID	ID	ID	Dia	Mtl	Install Date	GIS	CCTV Survey	Need CCTV?	Inspection Date	Survey Direction	Structural QR	O&M QR	Grade 5	Grade 4	Grade 3	Grade 2	Grade 1	Maint. Needed?	Maint. Method	R&R Needed?	R&R Reason	Full Pipe Replace-ment	Rehab		Comment
																							CIPP	Spot Repair	
MH 5-7_To_MH 5-9	MH 5-7	MH 5-9	12		1976	257	258	N	11/6/2023	Downstream	0000	0000						N		N					
MH 5-8_To_MH 5-9	MH 5-8	MH 5-9	6		1976	175	174.7	N	10/11/2023	Downstream	4100	0000		B(5.5)			Tap(4.5, 74.8, 118.5, 140.9, 173.8), MMC(120.7, 172.8)	N		Y	Grade 3+ Structural Defect			X	
MH 5-9-A_To_MH 5-9	MH 5-9-A	MH 5-9	6		1976	337	326.9	N	10/11/2023	Upstream	0000	0000					MWL(9.5), Tap(122.3, 192.1), MMC(320.4)	N		N					
CO 6-10-A_To_MH 6-10	CO 6-10-A	MH 6-10	6			33	29.6	N	2/23/2024	Downstream	3800	0000		SCP (5-29)			Tap (29.6)	N		Y	Grade 3+ Structural Defect		X		
MH 6-11_To_MH 6-10	MH 6-11	MH 6-10	8	PVC	After 1976	342	340.5	N	12/4/2023	Downstream	2300	0000				MWLS 25% (99-150, 335)	Tap (11.7, 32.6, 165.1, 307.1)	N		N					Could consider spot repairs for minor sags
MH 6-12_To_MH 6-11	MH 6-12	MH 6-11	8	PVC	After 1976	339	345.5	N	11/21/2023	Downstream	2300	0000				MWLS 15% (100.3) JOS (99.2) SSS (302-340)	Tap (95.1, 101.5, 102.7, 139.5, 251.9) MMC DIP (304.1) MMC PVC (340.1)	N		N					Consider lining or replacing CIP section
CO 6-3_To_MH 6-12	CO 6-3	MH 6-12	8		After 1976	220	210.9	N	11/21/2023	Downstream	0000	0000					Tap (5.5, 57.5, 204.3, 210.9)	N		N					
CO 7-2_To_MH 6-1	CO 7-2	MH 6-1	6	AC	1976	253.0413	246.7	N	9/27/2023	Upstream	3300	5131	RMB (84-90.8)		JSM (22) RML (90.8) JOM (154, 238.9)		RFJ (22, 53.5, 91.5) TF (23.8, 84, 91.5, 157.4, 177.9, 224.1, 240.9, 242.8, 244.9)	Y	Root Removal	Y	Grade 3+ Structural Defect			X	
MH 6-1_To_MH 6-2	MH 6-1	MH 6-2	6		1976	372	369.1	N	9/27/2023	Downstream	3600	5100	DSGV (271.7) 35%		JSM(92.2), JOM (114.9, 139.7, 219.1, 273.3, 335.8)		TF(89, 91, 117, 129.3, 142.2, 169.6, 196.2, 215.2, 220.8, 271.6, 275.2, 303.7, 337.5), MMC (89.7, 92.2, 115.7, 118.9, 139.7, 143.1, 167.9, 170.9, 194.8, 197.4, 221.8, 247.3, 250.1, 273.3, 276.3, 302.4, 304.7 335.8, 337.7)	Y	Heavy Cleaning	Y	Grade 3+ Structural Defect	X			
MH 6-3_To_MH 6-2	MH 6-3	MH 6-2	12		1976	230	227	N	11/6/2023	Downstream	2100	0000				MWLS 25% (43.7)	MWL 10% (0, 57)	N		N					
MH 6-4_To_MH 6-3	MH 6-4	MH 6-3	8		1976	163	174	N	10/9/2023	Downstream	0000	0000					Tap (143)	N		N					
MH 6-8_To_MH 6-3	MH 6-8	MH 6-3	6		After 1976	300	300.3	N	11/17/2023	Downstream	0000	0000					Tap (28.6, 111.5)	N		N					
MH 6-5_To_MH 6-4	MH 6-5	MH 6-4	8	AC	1976	400	403	N	10/9/2023	Downstream	3100	0000			JSM (107)		Tap (93,109, 201, 243, 310, 325, MMC (324 to 326 - PVC)	N		Y	Grade 3+ Structural Defect			X	
MH 7-8_To_MH 6-4	MH 7-8	MH 6-4	6		1976	195	185.1	N	9/27/2023	Downstream	0000	0000						N		N					
MH 6-6_To_MH 6-5	MH 6-6	MH 6-5	8		1976	189	186.4	N	10/9/2023	Downstream	0000	0000					MWL(0), MGP(12.2), Tap(85.5, 97.3)	N		N					
MH 6-7_To_MH 6-6	MH 6-7	MH 6-6	6		1976	409	404.5	N	9/26/2023	Downstream	0000	3100			DSZ (71.5)		MWL(55.8), Tap(79.1,127.5,154.9,175.5,246.8,263.6, 276.5, 317), MGP(13.4,14.8,37,131.5,215.6, 395.5)	Y	Heavy Cleaning	N					
MH 7-10_To_MH 6-6	MH 7-10	MH 6-6	6	AC	1976	374	362	N	11/9/2023	Downstream	3500	0000			JOM (83, 162, 269, 360) JSM (210)		Tap (103, 137, 150, 246, 342, 360) MMC (341 to 343 - PVC saddle for tap) MMC (360 to 362 - PVC saddle for tap)	N		Y	Grade 3+ Structural Defect			X	
CO 6-1_To_MH 6-7	CO 6-1	MH 6-7	6		1976	227	223.4	N	9/26/2023	Upstream	4112	0000		B(5.9)		MWLS(204.9)	Tap(104.7, 183.8, 204.1, 205, 206.4, 216.2, 220.5), MMC (203.8)	N		Y	Grade 3+ Structural Defect			X	
MH 7-12_To_MH 6-7	MH 7-12	MH 6-7	6		1976	365	356.3	N	9/26/2023	Upstream	4133	0000		B(181.2)	JSM(151.4), JOM (180.9, 356.3)		Tap (81.3, 98.4, 156, 167.7, 218.7, 275.4, 318.1, 356.3), MMC(274.5, 277.4)	N		Y	Grade 3+ Structural Defect			X	
MH 8-1_To_MH 6-7	MH 8-1	MH 6-7	6	AC	1976	440	310	N	9/25/2023	Upstream	5143	0000	MWLS 50-75%+ (at MH-F14)	B (2, 265) JSL (291)	OBM 15% (105) JOM (214) JSM (238, 240)		MWLS 25% (10) Tap (98, 122, 162, 208, 209, 213, 222, 265, 284) MMC (208 to 210 - PVC) MMC (213 to 215 - PVC) MMC (265 to 267 - PVC) MMC (291 to MSA - PVC)	N		Y	Grade 3+ Structural Defect	X			
MH 6-8-A_To_MH 6-8	MH 6-8-A	MH 6-8	6	PVC	After 1976	140	129.3	N	11/17/2023	Downstream	0000	0000					Tap (5.4, 103.1)	N		N					
MH 6-8-B_To_MH 6-8-A	MH 6-8-B	MH 6-8-A	8	PVC	After 1976	75	70.6	N	11/17/2023	Downstream	0000	0000						N		N					
MH 6-8-C_To_MH 6-8-B	MH 6-8-C	MH 6-8-B	8	PVC	After 1976	100	99.7	N	11/17/2023	Upstream	0000	0000					Tap (61.4, 70.7, 90.6)	N		N					
MH 6-8-G_To_MH 6-8-B	MH 6-8-G	MH 6-8-B	8	PVC	After 1976	214	212.8	N	11/17/2023	Upstream	0000	0000					Tap Capped (174.5)	N		N					
CO 6-8-D_To_MH 6-8-C	CO 6-8-D	MH 6-8-C	8		After 1976	35	32.1	N	2/23/2024	Upstream	0000	0000					Tap (10.6, 19.9)	N		N					
CO 6-8-F_To_MH 6-8-G	CO 6-8-F	MH 6-8-G	8	PVC	After 1976	96	87.3	N	11/17/2023	Upstream	0000	0000					Tap (57.5, 73.4, 84.5)	N		N					
MH 6-10_To_MH 6-9	MH 6-10	MH 6-9	8		After 1976	120	120.8	N	12/4/2023	Downstream	0000	0000					MWL 10% (26.7)	N		N					
MH 7-9_To_MH 7-10	MH 7-9	MH 7-10	6		1976	339	335.2	N	10/9/2023	Downstream	0000	0000					TF(23.6, 103.2, 128.9, 231.3, 277.8, 320.9), RPL(329.2)	N		N					
CO 7-8_To_MH 7-11	CO 7-8	MH 7-11	6		1976	162	164.9	N	9/26/2023	Upstream	4123	0000		B(25.4)	JOM(24.3), JSM(24.7)		TF(25.9, 93.1, 162.4), RFJ(26.7)	N		Y	Grade 3+ Structural Defect			X	
CO 7-7_To_MH 7-12	CO 7-7	MH 7-12	6		1976	218	213.3	N	9/26/2023	Upstream	3100	0000			JOM (133.6)		TF(93, 158.6, 169.4, 173.1, 187, 208.3, 211.1)	N		Y	Grade 3+ Structural Defect			X	
MH 7-11_To_MH 7-12	MH 7-11	MH 7-12	6		1976	183	175.3	N	9/26/2023	Upstream	0000	0000					TF (53, 138.9)	N		N					
CO 10-2_To_MH 7-12-A	CO 10-2	MH 7-12-A	6		1976	4.1		Y																	
CO 10-2-A_To_MH 7-12-A	CO 10-2-A	MH 7-12-A	6		1976	15.3		Y																	
MH 7-13A_To_MH 7-13	MH 7-13A	MH 7-13	6		1976	172.7		Y																	
CO 7-4_To_MH 7-14	CO 7-4	MH 7-14	6		1976	35		Y																	
MH 7-13_To_MH 7-14	MH 7-13	MH 7-14	6		1976	237		Y																	
CO-19_To_MH 7-2	CO-19	MH 7-2	6		1976	325	270.6	N	10/10/2023	Upstream	0000	0000						N		N					

	MH ID		Pipe					CCTV Survey		PACP Assessment							Preliminary Pipeline Action(s)							
	U/S	D/S				Length						PACP Code and (Footage)					O&M Action				R&R Action			
Pipe ID	ID	ID	Dia	Mtl	Install Date	GIS	CCTV Survey	Need CCTV?	Inspection Date	Survey Direction	Structural QR	O&M QR	Grade 5	Grade 4	Grade 3	Grade 2	Grade 1	Maint. Needed?	Maint. Method	R&R Needed?	R&R Reason	Full Pipe Replace-ment	Rehab		Comment
																							CIPP	Spot Repair	
MH 7-2_To_MH 7-3	MH 7-2	MH 7-3	6		1976	113	104.6	N	9/26/2023	Downstream	0000	0000					TF(32.6)	N		N					
CO 7-9_To_MH 7-4	CO 7-9	MH 7-4	6		After 1976	94	95.2	N	12/1/2023	Downstream	3200	0000			JOM (12.6, 63)		MWL 5% (14.2) Tap (75.4, 78.6, 81.5, 87.5)	N		Y	Grade 3+ Structural Defect		X		
MH 7-14_To_MH 7-4	MH 7-14	MH 7-4	6		1976	196	194.1	N	9/26/2023	Upstream	0000	0000					TF(74.2)	N		N					
MH 7-3_To_MH 7-4	MH 7-3	MH 7-4	6		1976	227	219.4	N	9/26/2023	Downstream	0000	0000				FC (215.3)	TF(11.9, 16, 26.8, 40.5, 71, 146, 162.1)	N		N					
CO 7-1_To_MH 7-5	CO 7-1	MH 7-5	6		1976	285	275.8	N	9/27/2023	Upstream	5133	0000	HSV (215.6)		JOM(0, 3, 210.1)		TF (79.9, 90.8, 127.4, 211.4, 252.5, 273.2), MMC(210.1, 213.2)	N		Y	Grade 3+ Structural Defect			X	
MH 7-4_To_MH 7-5	MH 7-4	MH 7-5	6		1976	173	158.6	N	9/26/2023	Upstream	5114	0000	JOL(158.6)	JOM(156.9)	JSM(72.4)		TF(71.8, 88.9)	N		Y	Grade 3+ Structural Defect			X	
MH 7-6_To_MH 7-5	MH 7-6	MH 7-5	6		1976	118	116.4	N	9/27/2023	Downstream	0000	0000					MWL(16.4)	N		N					
CO 7-5_To_MH 7-6	CO 7-5	MH 7-6	6		1976	180	177.4	N	9/27/2023	Upstream	4143	0000		JSL(21.7)	JOM(15.9, 156.8, 164.4), JSM (161.7)		MMC(15.9, 21.7), TF(17.4, 70.2 123.3, 126.5, 162.8, 174.1)	N		Y	Grade 3+ Structural Defect	X			
CO 7-3_To_MH 7-7	CO 7-3	MH 7-7	6	AC	After 1976	120	123.4	N	12/1/2023	Upstream	3100	0000			JOM (37.3)		Tap (48.3, 79.8, 121.3)	N		Y	Grade 3+ Structural Defect		X		
MH 7-5_To_MH 7-7	MH 7-5	MH 7-7	6		1976	363	356.9	N	9/27/2023	Downstream	3132	0000			JOM(342.7)	CC(2, 127.8), IS(2)	TF(76.7, 136.8)	N		Y	Grade 3+ Structural Defect			X	
CO 7-6_To_MH 7-8	CO 7-6	MH 7-8	6		1976	266	263.1	N	9/27/2023	Upstream	0000	0000					TF(43.6, 93.7, 143.8, 204.3, 215.1, 206.6), MMC (215.1, 216.8)	N		N					
MH 7-7_To_MH 7-8	MH 7-7	MH 7-8	6		1976	50	45.5	N	10/10/2023	Downstream	3100	0000			JSM(5.6)			N		Y	Grade 3+ Structural Defect			X	
MH 10-8_To_MH 7-9	MH 10-8	MH 7-9	6		1976	324	307.8	N	10/9/2023	Downstream	0000	0000					TF(280.5)	N		N					
CO 8-3_To_MH 8-1	CO 8-3	MH 8-1	6		1976	431	335.3	N	9/25/2023	Upstream	4143	0000		JOL(50.9)	JSM(51.7, 178.4), JOM(331.7, 335.3)	MWLS (332.9)	Tap (51.1, 85.6, 145.4, 180.5, 211.1, 269.6), SRI(24.9)	N		Y	Grade 3+ Structural Defect	X			100 ft not inspected due to offset couldn't pass
MH 8-2_To_MH 8-1	MH 8-2	MH 8-1	6	AC	1976	369	361.6	N	9/25/2023	Upstream	3200	0000			JSM(6.2, 136.7)		TF(65.6, 134.1, 136.1, 154.9, 214.1, 255.1), MMC(134, 136.7)	N		Y	Grade 3+ Structural Defect			X	
MH 9-2_To_MH 9-1-C	MH 9-2	MH 9-1-C	6		1976	335	341	N	10/2/2023	Upstream	0000	0000					Tap (15, 75, 135, 192, 333)	N		N					
CO 8-2_To_MH 8-2	CO 8-2	MH 8-2	6		1976	435	414.6	N	9/25/2023	Upstream	4133	0000		JOL(413.2)	JOM(0.3, 150.7, 326.3)		TF(0.3, 7.1, 143, 148.9, 167.2, 178.6, 195.3, 257.2, 309.7, 325.6, 391.5), MMC (140.9, 150.7, 413.2)	N		Y	Grade 3+ Structural Defect	X			
MH 8-4_To_MH 8-2	MH 8-4	MH 8-2	6	AC	1976	25	2.6	N	9/25/2023	Upstream	4100	0000		JOL (2)			MWL 5% (0) MMC to AC (2) MSA (2.6)	N		Y	Grade 3+ Structural Defect	X			Joint offset at PVC segment
CO 8-4_To_MH 8-3	CO 8-4	MH 8-3	6		After 1976	178	154.3	N	11/17/2023	Downstream	2R00	0000			SSS (0-96) DAZ (entire length at bottom)		Tap (72.6, 131.4, 154.3 (x2)) MMC PVC (153.7)	Y	Heavy Cleaning	Y	Grade 3+ Structural Defect		X		CIPP for spalling after heavy cleaning
CO 9-4_To_MH 8-4	CO 9-4	MH 8-4	8	PVC	After 1976	138	139.9	N	11/21/2023	Upstream	3100	0000				JSS (101)	Tap (41.8, 136.3, 138)	N		N					
MH 8-5_To_MH 8-4	MH 8-5	MH 8-4	6	PVC/AC	1976	256	254.4	N	9/25/2023	Upstream	4100	0000		JOL (1)			MWL 5% (0) Tap (53.7, 69.6, 77.1, 125.3, 144.9) MMC to AC (1) MMC to PVC (148.6)	N		Y	Grade 3+ Structural Defect			X	
CO 8-1_To_MH 8-5	CO 8-1	MH 8-5	6	PVC	1976	212	205	N	11/21/2023	Upstream	0000	0000					Tap (35.2, 135.5, 190.7, 198.6)	N		N					
MH 9-1-B_To_MH 9-1-A	MH 9-1-B	MH 9-1-A	6		1976	149.80259	148.4	N	10/2/2023	Upstream	0000	0000					TF(19.6, 36.7, 96.6, 146.7)	N		N					
MH 9-3_To_MH 9-2	MH 9-3	MH 9-2	6		1976	290	91	N	10/2/2023		4100	0000		JOL (91)			Tap (90.7)	N		Y					MSA Unknown; need rest of line
MH 9-4_To_MH 9-3	MH 9-4	MH 9-3	6	AC	1976	248.37807	254.6	N	10/2/2023	Upstream	3300	1400			JOM (72.7, 74.8, 249.4)		TF (4, 74.1) MMC (72.8, 74.8) RFJ (74.8) DAGS (60-71)	Y	Root Removal and Heavy Cleaning	Y	Grade 3+ Structural Defect			X	
MH 6-9_To_MH 5-7	MH 6-9	MH 5-7	12	AC	1976		189.2	N	11/6/2023	Upstream	0000	0000					MWL 10% (0) Tap (82.9)	N		N					
CO 9-3_To_MH 9-4	CO 9-3	MH 9-4	6	AC	1976	136.53632	128.4	N	12/1/2023	Upstream	0000	0000					Tap (96.6, 123.5)	N		N					

Section 4 – Structural

C – Crack 4-2

CC	Circumferential
CH	Hinge (2, 3, 4)
CL	Longitudinal
CM	Multiple
CS	Spiral

F – Fracture 4-8

FC	Circumferential
FH	Hinge (2, 3, 4)
FL	Longitudinal
FM	Multiple
FS	Spiral

B – Broken 4-15

B	Broken
BSV	Soil Visible
BVV	Void Visible

H – Hole 4-18

H	Hole
HSV	Soil Visible
HVV	Void Visible

D – Deformed (Rigid) 4-21

DR	Deformed Rigid

No modifiers used.

D – Deformed (Flexible) 4-21

DFBI	Bulging Inverse Curvature
DFBR	Bulging Round
DFC	Creasing
DFE	Elliptical

D – Deformed (Brick) 4-21

DTBI	Bulging Inverse Curvature
DTBR	Bulging Round

X – Collapse 4-32

X	Collapse

No descriptors or modifiers used.

J – Joint 4-36

J	Joint

Used to record the existence of a joint without descriptors or modifiers.

J – Joint (Offset) 4-36

JOL	Offset Large
JOM	Offset Medium
JOS	Offset Small

J – Joint (Offset Defective) 4-36

JOLD	Offset Large Defective
JOMD	Offset Medium Defective
JOSD	Offset Small Defective

J – Joint (Separated) 4-36

JSL	Separation Large
JSM	Separation Medium
JSS	Separation Small

J – Joint (Angular) 4-36

JAL	Angular Large
JAM	Angular Medium
JAS	Angular Small

S – Surface Damage 4-44

SAM	Aggregate Missing
SAP	Aggregate Projecting
SAV	Aggregate Visible
SCP	Surface Damage Corrosion
SMW	Missing Wall

S – Surface Damage 4-44

SPP	Pitting/Corrosion
SRC	Reinforcement Corroded
SRI	Roughness Increased
SRP	Reinforcement Projecting
SRV	Reinforcement Visible

S – Surface Damage 4-44

SSC	Surface Spalling of Coating
SSS	Surface Spalling
SZ	Other
SZD	Other Defective

LF – Lining Features 4-60

LFAC	Abandoned Connection
LFAS	Annular Space
LFB	Blistered
LFCS	Service Cut Shifted

LF – Lining Features 4-60

LFD	Detached
LFDC	Discoloration
LFDE	Defective End
LFDL	Delamination

LF – Lining Features 4-60

LFOC	Overcut Service
LFRS	Resin Slug
LFUC	Undercut Service
LFW	Wrinkled
LFZ	Other

WF – Weld Failure 4-77

WFC	Circumferential
WFL	Longitudinal
WFM	Multiple
WFS	Spiral
WFZ	Other

RP – Point Repair 4-80

RPL	Liner
RPLD	Liner Defective
RPM	Mechanical Sleeve
RPMD	Mechanical Sleeve Defective
RPP	Patch

RP – Point Repair 4-80

RPPD	Patch Defective
RPR	Replacement
RPRD	Replacement Defective
RPZ	Other
RPZD	Other Defective

BT – Bolts – Metal Pipe 4-88

BTL	Loose
BTM	Missing

Brickwork 4-92

DB	Displaced
DI	Dropped Invert
MB	Missing

Brickwork 4-92

MML	Mortar Missing Large
MMM	Mortar Missing Medium
MMS	Mortar Missing Small

Section 5 – Operation and Maintenance

D – Deposits (Attached) 5-2

DAE	Encrustation
DAGS	Grease
DAR	Ragging
DAZ	Other

D – Deposits (Settled) 5-2

DSC	Hard/Compact
DSF	Fine
DSGV	Gravel
DSS	Sanitary
DSZ	Other

D – Deposits (Ingress) 5-2

DNF	Fine (silt/sand)
DNGV	Gravel
DNZ	Other

R – Roots (Fine) 5-10

RFB	Barrel
RFC	Connection
RFJ	Joint
RFL	Lateral

R – Roots (Medium) 5-10

RMB	Barrel
RMC	Connection
RMJ	Joint
RML	Lateral

R – Roots (Ball) 5-10

RBB	Barrel
RBC	Connection
RBJ	Joint
RBL	Lateral

R – Roots (Tap) 5-10

RTB	Barrel
RTC	Connection
RTJ	Joint
RTL	Lateral

I – Infiltration (Stain) 5-19

ISB	Barrel
ISC	Connection
ISJ	Joint
ISL	Lateral

I – Infiltration (Weeper) 5-19

IWB	Barrel
IWC	Connection
IWJ	Joint
IWL	Lateral

I – Infiltration (Dripper) 5-19

IDB	Barrel
IDC	Connection
IDJ	Joint
IDL	Lateral

I – Infiltration (Runner) 5-19

IRB	Barrel
IRC	Connection
IRJ	Joint
IRL	Lateral

I – Infiltration (Gusher) 5-19

IGB	Barrel
IGC	Connection
IGJ	Joint
IGL	Lateral

OB – Obstacles/ Obstructions 5-29

OBB	Brick or Masonry
OBC	Obstruction Through Connection

OB – Obstacles/ Obstructions 5-29

OBI	Obstruction Intruding Through Wall
OBJ	Wedged in Joint
OBM	Pipe Material in Invert

OB – Obstacles/ Obstructions 5-29

OBN	Construction Debris
OBP	External Pipe or Cable
OBR	Rocks
OBS	Built into Structure
OBZ	Other

V – Vermin 5-42

VC	Cockroach
VR	Rat
VZ	Other

G – Grout Test and Seal 5-46

GRT	Grout at a Location
GTFJ	Test Fail Joint
GTFL	Test Fail Lateral

G – Grout Test and Seal 5-46

GTPJ	Test Pass Joint
GTPL	Test Pass Lateral
GTUJ	Unable to Test Joint
GTUL	Unable to Test Lateral

For Pressure Pipe Codes see Appendix F.

Section 6 – Construction

T – Tap (Break-In) 6-2	T – Tap (Drop) 6-2	T – Tap (Factory Made) 6-2	T – Tap (Rehabilitated) 6-2	T – Tap (Saddle) 6-2	IS – Intruding Sealing Material 6-17	IS – Intruding Sealing Material 6-17
TBA Active TBB Abandoned TBC Capped TBD Defective TBI Intruding	TDA Active TDB Abandoned TDC Capped TDD Defective TDI Intruding	TFA Active TFB Abandoned TFC Capped TFD Defective TFI Intruding	TRA Active TRB Abandoned TRC Capped TRD Defective TRI Intruding	TSA Active TSB Abandoned TSC Capped TSD Defective TSI Intruding	ISGT Grout ISSR Sealing Ring ISSRB Sealing Ring Broken	ISSRH Sealing Ring Hanging ISSRL Sealing Ring Loose ISZ Other
L – Line 6-22	**L – Line 6-22**	**A – Access Points 6-26**	**A – Access Points 6-26**	**A – Access Points 6-26**	For Pressure Pipe Codes see Appendix F.	
LD Down LL Left LLD Left Down LLU Left Up	LR Right LRD Right Down LRU Right Up LU Up	ACB Catch Basin ACBS Catch Basin with Sump ACOH Cleanout House ACOM Cleanout Mainline ACOP Cleanout Property ADP Discharge Point	AEP End of Pipe AIN Inlet AJB Junction Box AM Meter AMH Manhole AOC Other Structure	ASC Siphon Chamber ATC Tee Connection AWA Wastewater Access AWW Wet Well AZ Other		

Section 7 – Miscellaneous

M – Miscellaneous 7-1	M – Miscellaneous 7-1	M – Miscellaneous 7-1	
MCU Camera Underwater MDC Discoloration MGO General Observation MGP General Photograph MJL Joint Length	MLC Lining Change MMC Material Change MSA Survey Abandoned MSC Shape/Size Change MWL Water Level	MWLS Water Level Sag MWM Water Mark MYN Dye Not Visible MYV Dye Visible	For Pressure Pipe Codes see Appendix F.

Attachment B

Manhole Database

Facility ID	Inspection Status	Cover Condition	Frame Condition	Chimney Condition	Cone Condition	Wall Condition	Bench Condition	Channel Condition	Count of Infiltration Staining Observations	Count of Defective + Corroded	Replace or Rehab
MH 0-3	Complete	Sound	Sound	Defective	NA - No Cone	Defective	Defective	Defective	0	4	Replace
MH 10-1	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	0	0	-
MH 10-2	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 10-3	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 10-4	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 10-5	Complete	Sound	Sound	NA - No Chimney	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 10-6	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 10-7	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 10-8	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 10-9	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 12-1	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 12-2	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 12-3	Complete	Sound	Sound	NA - No Chimney	NA - No Cone	Sound	Sound	Sound	0	0	-
MH 12-4	Complete	Sound	Sound	Defective	Sound	Sound	Sound	Sound	1	1	Rehab
MH 12-5	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 12-6	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 12-7	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 12-8	Complete	Sound	Sound	NA - No Chimney	NA - No Cone	Sound	NA - No Bench	NA - No Channel	0	0	-
MH 1-3	Complete	Sound	Sound	Defective	Defective	Defective	Defective	Defective	1	5	Replace
MH 13-1	Complete	Sound	Sound	Defective	Defective	Sound	Sound	Sound	1	2	Rehab
MH 13-1-C	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 13-2	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 13-3	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 13-4	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 15-2	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 15-4	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 15-6	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 15-7	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 2-1	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	NA - No Channel	1	0	-
MH 2-2	Complete	Sound	Sound	Sound	Sound	Sound	Sound	NA - No Channel	0	0	-
MH 2-3-A	Complete	Sound	Sound	Sound	Sound	Sound	Defective	NA - No Channel	1	1	Rehab
MH 2-3-B	Complete	Sound	Sound	Defective	Sound	Sound	Sound	Sound	1	1	Rehab
MH 2-4	Complete	Corroded	Corroded	Sound	NA - No Cone	Defective	Defective	NA - No Channel	1	4	Replace
MH 2-5	Complete	Sound	Sound	Defective	NA - No Cone	Defective	Defective	Defective	1	4	Replace
MH 2-6	Complete	Sound	Sound	Defective	Sound	Sound	Sound	NA - No Channel	0	1	Rehab
MH 2-7	Complete	Sound	Sound	Defective	NA - No Cone	Sound	Sound	NA - No Channel	0	1	Rehab
MH 3-1	Complete	Corroded	Corroded	Defective	Defective	Defective	Defective	NA - No Channel	1	6	Replace
MH 3-2	Complete	Corroded	Corroded	Defective	NA - No Cone	Sound	Sound	Sound	1	3	Replace
MH 3-3	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	NA - No Channel	1	0	-
MH 3-4	Complete	Sound	Sound	Defective	NA - No Cone	Defective	Defective	Defective	1	4	Replace
MH 3-5	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 4-1	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	0	0	-
MH 4-2	Complete	Corroded	Corroded	Sound	Sound	Sound	NA - No Bench	NA - No Channel	0	2	Rehab
MH 4-3	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 4-4	Complete	Sound	Corroded	NA - No Chimney	NA - No Cone	Sound	Sound	Sound	0	1	Rehab
MH 4-5	Complete	Corroded	Corroded	Sound	Sound	Sound	Sound	Sound	1	2	Rehab
MH 4-8	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 5-1	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	2	0	-
MH 5-10	Complete	Corroded	Corroded	Sound	Sound	Sound	Sound	Sound	0	2	Rehab
MH 5-11-A	Complete	Corroded	Corroded	Sound	Sound	Sound	Sound	Sound	3	2	Rehab
MH 5-12	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 5-2	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Defective	0	1	Rehab
MH 5-4	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 5-5	Complete	Corroded	Corroded	Sound	Sound	Sound	Sound	Sound	0	2	Rehab
MH 5-6	Complete	Sound	Sound	Defective	Sound	Sound	Sound	Sound	1	1	Rehab
MH 5-7	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 5-8	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 5-9	Complete	Corroded	Corroded	Defective	Sound	Sound	Sound	Sound	0	3	Replace
MH 5-9-A	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-1	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 6-11	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-12	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-2	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-3	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-4	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-5	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 6-6	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-7	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Defective	0	1	Rehab
MH 6-8	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-8-A	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-8-B	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-8-C	Complete	Sound	Sound	Sound	Sound	Sound	Sound		0	0	-
MH 6-8-F	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-8-G	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 6-9	Complete	Sound	Sound	NA - No Chimney	NA - No Cone	Sound	Sound	Defective	1	1	Rehab
MH 7-10	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 7-11	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 7-12	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 7-2	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	0	0	-
MH 7-3	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 7-4	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 7-5	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 7-6	Complete	Sound	Sound	Sound	Sound	Sound	Sound	NA - No Channel	0	0	-
MH 7-7	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 7-8	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 7-9	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 8-1	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	0	0	-
MH 8-2	Complete	Sound	Sound	Sound	NA - No Cone	Sound	Sound	Sound	1	0	-
MH 8-3	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 8-4	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 9-1-A	Complete	Sound	Sound	Sound	Sound	Sound	NA - No Bench	NA - No Channel	1	0	-
MH 9-1-C	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH 9-3	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	1	0	-
MH-6-10-A	Complete	Sound	Corroded	Sound	Sound	Sound	Sound	Sound	0	1	Rehab
MH-6-12-A	Complete	Sound	Sound	Sound	Sound	Sound	Sound	Sound	0	0	-
MH 7-12-A	Incomplete - Not Accessible										TBD

Facility ID	Inspection Status	Cover Condition	Frame Condition	Chimney Condition	Cone Condition	Wall Condition	Bench Condition	Channel Condition	Count of Infiltration Staining Observations	Count of Defective + Corroded	Replace or Rehab
MH 7-13	Incomplete - Not Accessible										TBD
MH 7-13-A	Incomplete - Not Accessible										TBD
MH 7-14	Incomplete - Not Accessible										TBD
MH 0-2	Incomplete - Not Found										Likely Replace based on adjacent MHs
MH 1-1	Incomplete - Not Found										Likely Replace based on adjacent MHs
MH 1-2	Incomplete - Not Found										Likely Replace based on adjacent MHs
MH 13-1-B	Incomplete - Not Found										TBD
MH 14-1	Incomplete - Not Found										TBD
MH 15-3	Incomplete - Not Found										Raise to grade
MH 15-5	Incomplete - Not Found										Raise to grade
MH 4-7	Incomplete - Not Found										TBD
MH 4-9	Incomplete - Not Found										TBD
MH 5-11	Incomplete - Not Found										TBD
MH 5-3	Incomplete - Not Found										TBD
MH 6-10	Incomplete - Not Found										TBD
MH 9-4	Incomplete - Not Found										TBD