Technical Memorandum

To: Brian Corcoran, VLAWMO

From: Chris Otterness, PE

Houston Engineering, Inc.

Subject: Public Drainage System Inspection Protocol

Date: March 31, 2023

Project: R007057-0015

INTRODUCTION

The purpose of this memorandum is to develop a drainage system inspection protocol for the Vadnais Lake Area Water Management Organization (VLAWMO) in its role as a Drainage Authority for County Ditch (CD) 14. This inspection protocol is to compliment the June 22, 2022 approved drainage policy. The VLAWMO operates under Minnesota Statue 103B. The following inspection protocol will provide the VLAWMO a timeframe and methodology to assess the conditions and effectively manage the CD 14 public drainage system under MS103B authority.

DRAINAGE SYSTEM INSPECTION PROTOCOL

The inspection protocol has been organized into three categories of public drainage system components:

- Open Channel / Flumes
- Stormsewer
- Roadway Culverts and Weirs

Each category requires varying levels of detail and frequency of inspection. The location of the systems within the VLAWMO are shown in **Figure 1 & Figure 2** and are identified in the attached Drainage System Inspection Schedule.

OPEN CHANNELS / FLUMES

Inspection needed to identify deficiencies and necessary maintenance can be categorized into three “inspection levels” based on the nature of the inspection and frequency it needs to be performed. **Table 1** identifies recommended frequencies for each inspection level for open channel/weir systems.

Table 1 – Open Channel/Flume System Inspection Levels and Frequencies

Inspection Level	Nature of Inspection	Frequency Interval	
		High Priority	Normal Priority
1	View system from road crossings, at complaint locations, and at other known problem areas	Yearly	Every 5 years, or in response to a complaint
2	Aerial drone survey or walking inspection of the entire ditch	Every 5 years, or one year after a major repair	Every 10 years, or one year after a major repair
3	Field survey of channel (ditch centerline at 200' spacing, follow 2018 HEI survey)	Preceding and following a major repair, and every 10 years thereafter	

Deficiencies in open channel/flume systems to be identified during the inspection include, but are not limited to:

- General lack of flow;
- Blockages to the open channel including localized deposits of sediment, trees, other woody debris, bogs, and beaver dams;
- Bank failures;
- Damaged or obstructed private culverts (system map **Figure 2**)
- Unpermitted crossings;
- Obstructions in right-of-way to access for future maintenance; and
- Extended portions of the drainage system needing repair.

STORMSEWER

Table 2 identifies recommended frequencies for each inspection level for systems.

Table 2 – Storm Sewer System Inspection Levels and Frequencies

Inspection Level	Nature of Inspection	Frequency Interval
1	View outlets and known problem areas	Every 5 years or in response to a complaint
2	Full televising of storm sewer	(By Municipality) Every 20 years
3	Field survey of inverts entering public drainage system	As needed

Deficiencies in storm sewer systems to be identified during the inspection include, but are not limited to:

- Separated pipe sections;
- Cracked, spalling, and otherwise failing pipe sections;
- Blockages; and
- Erosion at inlet and outlet end sections.

Note: There are three locations on CD 14 where flows are conveyed via stormsewer that is within road right-of-way or easements held by a municipality. The locations include:

Location 1: Branch crossing under Clover Avenue, including outlet of Basswood Lake
Location 2: Main Trunk stormsewer parallel to County Road F outletting to Lambert Lake
Location 3: Branch 5 crossing of Edgerton Road, draining into Main Trunk

The locations of these three stormsewer segments are shown in **Figure 2**. Historic documentation of these system modifications is limited. As there is a dual role in managing these locations in the public drainage system that are within the road authority right-of-way or easement, additional coordination with these entities is required prior to interior inspection and maintenance of these systems. Maintenance and inspection of any structures placed in the public drainage system is the responsibility of the entity that placed it.

ROADWAY CULVERTS (ROAD AUTHORITY RESPONSIBILITY) & WEIRS

Table 3 identifies recommended frequencies for each inspection level for systems.

Table 3 – Roadway Culvert and Weir Inspection Levels and Frequencies

Inspection Level	Nature of Inspection	Frequency Interval
1	View outlets and known problem areas	Every 5 years and following significant (>3") rainfall events
2	Full televising of storm sewer inlets	As needed

Deficiencies in roadway culverts and weirs to be identified during the inspection include, but are not limited to:

- Blockages at the culvert inlet end;
- Pipe joint failures;
- Frost heaving; and
- Obstructions in right-of-way to access for future maintenance

Maintenance and inspection of any structures placed in the public drainage system is the responsibility of the entity that placed it.

DOCUMENTATION

All inspections and documents of the public drainage system (completed by VLAWMO or City staff or their consultants) should be documented within the VLAWMO shared drive, under the "Public Drainage Maintenance" file: (S:\Public Drainage Maintenance)

SCHEDULE

A proposed schedule for inspection is provided in **Figure 3**. The schedule identifies recommended inspections over a 16-year period by level for the public drainage system and/or branch. This schedule is intended to not only coordinate yearly inspections, but also assist with annual budgeting.

RECOMMENDATION

We recommend that the VLAWMO Board of Directors formally adopt the preceding public drainage system inspection protocol and that VLAWMO staff begin implementation immediately. Further, we recommend the VLAWMO reference this inspection protocol within the public drainage policy, as amended. VLAWMO staff should revisit the schedule in **Figure 3** yearly to verify that it reflects current priorities and budgets and revise the schedule accordingly.

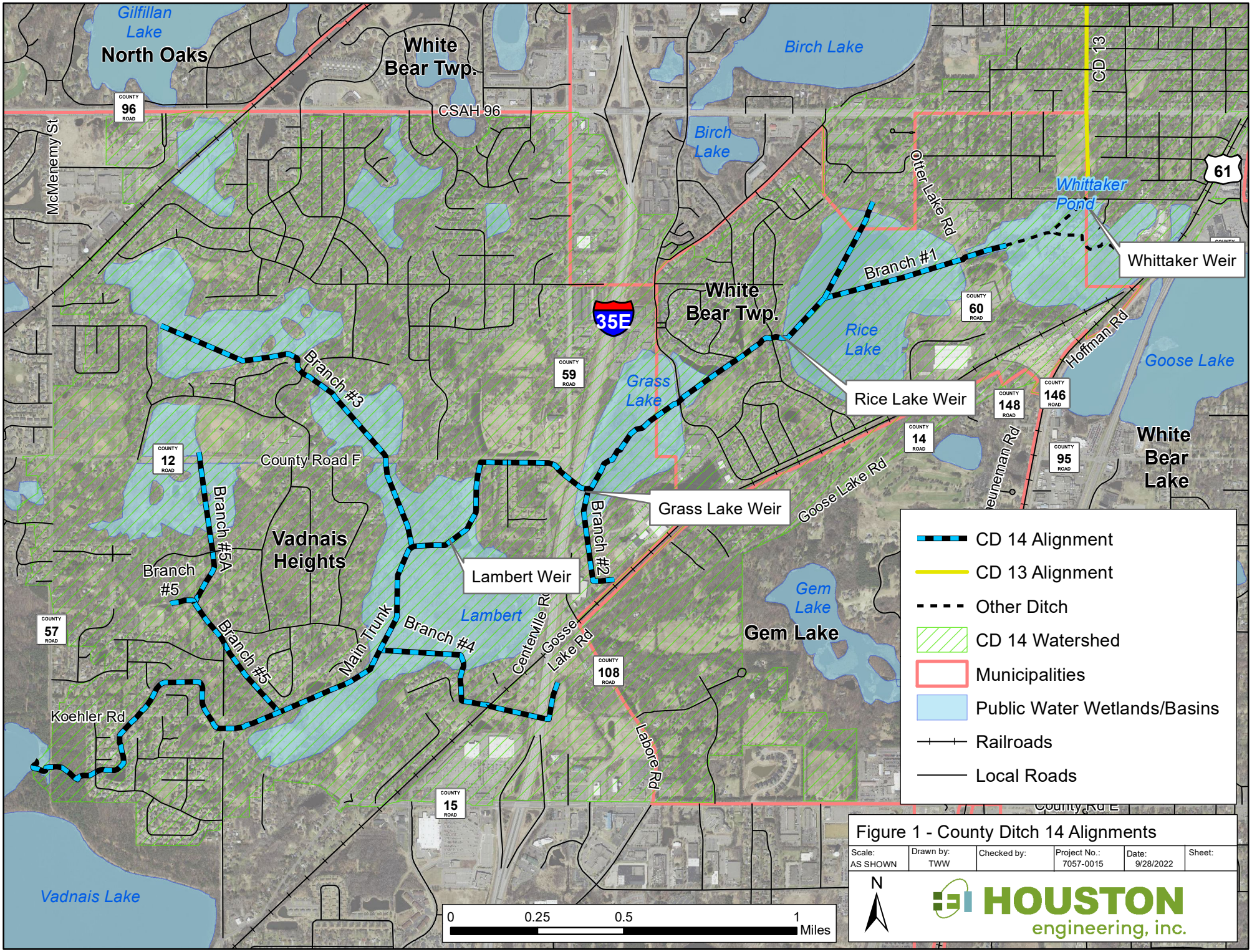

Figure 1 - County Ditch 14 Alignments

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AS SHOWN	TWW		7057-0015	9/28/2022	

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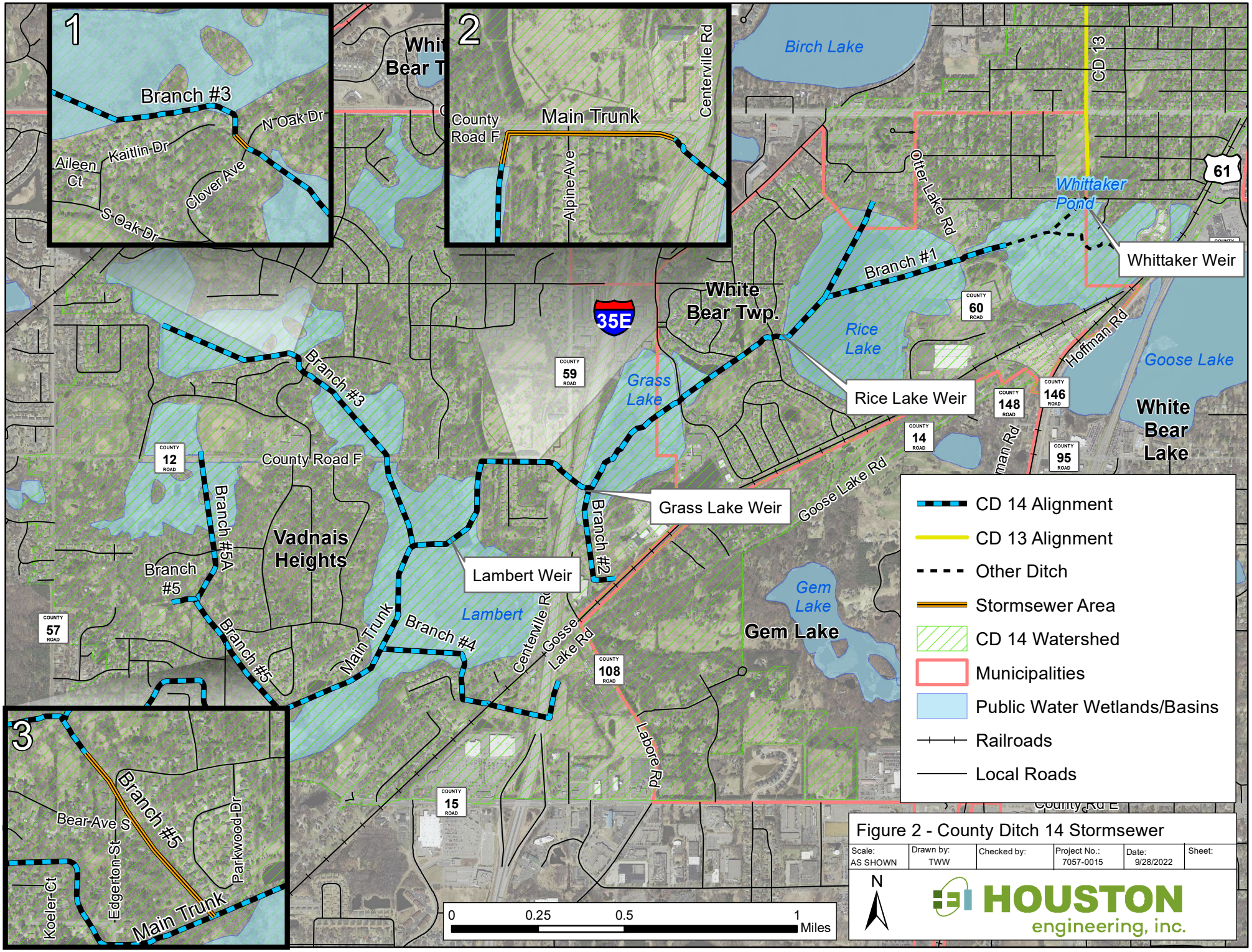

Figure 2 - County Ditch 14 Stormsewer

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Figure 3

VLAWMO Drainage System Inspection Schedule

Last Updated: 30-Mar-23

Inspection Type

- Level 1
- Level 2
- Level 3

X - repair completed or scheduled

- Level 2 and 3 inspections completed

Drainage System	Branch	System Type	Inspection Priority	2023	2024	2025	2026	2027		2028	2029	2030	2031	2032	2033	2034	2035	2036	2037		2038	2039
Lambert Creek (CD14)	Main Trunk	Open Channel	High																			
	Branch 1	Open Channel	normal																			
	Branch 2	Open Channel	normal																			
	Branch 3	Open Channel	normal																			
	Branch 4	Open Channel	normal																			
	Branch 5	Open Channel	normal																			
	Branch 5A	Open Channel	normal																			

*We intend on doing a level 1 on entire system in 2023

Open Channel and Flumes

Level 1 inspection – View from road crossings, and at known problem areas. Schedule: every year (high priority), every 10 years (normal priority), or in response to complaint

Level 2 inspection – Aerial drone survey or walking survey. Schedule: Every 5 years (high priority), every ten years (normal priority), or one year following a major repair

Level 3 inspection – Full survey of ditch (200' spacing on centerline, follow 2018 HEI survey). Schedule: Prior to a major repair (Repair Report); every 10 years following a major repair.

Stormsewer

Level 1 inspection – Check outlets and known problem areas

Level 2 inspection – Full televising of stormsewer. City,Township & County responsibility

Roadway Culverts and Weirs

Responsibility of entity that constructed the structure