



LOWER MINNESOTA RIVER WATERSHED DISTRICT

Executive Summary for Action

Lower Minnesota River Watershed District Board of Managers Meeting
Wednesday, November 16, 2022

Agenda Item

Item 6. D. – Dredge Management

Prepared By

Linda Loomis, Administrator

Summary

At the September 2022 meeting of the LMRWD Board of Managers, Young Environmental Consulting Group (YECG) presented a report on the condition of Vernon Avenue and the access road to the LMRWD dredge material management site (Site). At the time of the inspection to prepare the report the culvert under the access road was obscured by vegetation. YECG revisited the site after a killing frost had killed the vegetation and an updated report is attached for the Board's information.

Attachments

Technical Memorandum – Lower Minnesota River Watershed District Dredge Site Update, dated November 9, 2022

Recommended Action

Motion to direct staff to continue work on recommendations of Technical Memorandums dated September 14, 2022 and November 9, 2022



Technical Memorandum

To: Linda Loomis, Administrator
Lower Minnesota River Watershed District

From: Erica Bock, Water Resources Scientist
Katy Thompson, PE, CFM
Hannah Leclaire, PE

Date: November 9, 2022

Re: Lower Minnesota River Watershed District Dredge Site Update

As outlined in the Lower Minnesota River Watershed District's (LMRWD's) workplan to the Board of Water and Soil Resources, the LMRWD will implement capital improvement projects and continue the operation and management (O&M) of the Cargill East River (MN—14.2 RMP) Dredge Material Site (Site) located on the Minnesota River in Savage, Minnesota (Figure 1). O&M activities include maintenance of Vernon Avenue and regular culvert cleaning. On August 22, 2022, Young Environmental staff visited the dredge site, documented the current site conditions, and attempted to validate the required O&M work. Staff were unable to document the current conditions of the access road and culvert due to heavy vegetation but were able to evaluate Vernon Avenue and made a recommendation to the board update at the September 2022 meeting to proceed with developing a scope of work for roadway maintenance or improvements through the LMRWD engineering pool (Attachment 1).

On October 25, 2022, Young Environmental staff revisited the dredge site to document the current site conditions of the access road culvert because it was obscured in August. The following documents the culvert conditions found at the time.

HydInfra

HydInfra is an asset management rating system used by MnDOT to assess the conditions of stormwater infrastructure in the field. MnDOT has developed a manual to allow others to utilize this methodology. The inspection criteria according to the HydInfra Inspection Manual are based on factors such as structural integrity and the integrity of the surrounding metal. The rating is 0–4, with 0 being not able to rate or not



visible, a high end of 1 being excellent and like-new condition, and a low end of 4 being severe or serious deterioration. Not included in the condition rating is need for cleaning, plugged infrastructure, sediment percentage full, water observed, and water percentage full.

Access Road Culvert HydInfra Assessment

The access road culvert is a 48-inch reinforced concrete pipe with flared aprons and trash guards. The upstream end of the culvert on the south side of the access road was completely blocked by sediment and tree debris, as shown in Attachment 2. The culvert location was not immediately discernable due to the large debris buildup, and like the previous site visit, Young Environmental staff were unable to find the culvert apron under the accumulated sediment (Photo 1, Attachment 2). The accumulated sediment has also created a stagnant pond immediately upstream of the culvert, which following rain events, likely increases in elevation as the water slowly percolates through the sediment and into the culvert downstream. This bounce in water surface elevations appears to be contributing to the erosion of the roadway embankment and the development of in-slope cavities forming above the pipe apron (Photo 2, Attachment 2).

The accumulated sediment at the upstream entrance was covered in vegetation but not solidly packed, and depressions and holes appeared to be forming above the presumed location of the culvert (Photo 3, Attachment 2). Depressions and vertical holes in the embankment fill above a culvert can often indicate that the culvert pipe sections have separated and are allowing the embankment fill to infiltrate the culvert.

Downstream, on the north side of the access road, the culvert, apron, trash guard, and riprap were all visible and appeared to be in good condition (Photo 4, Attachment 2). There were no visible cracks or joint separation and only minor blemishes on the culvert itself; however, the pipe appeared to be approximately 30 percent filled with sediment (Photo 5, Attachment 2). The culvert and downstream channel showed no signs of flowing water, likely due to the blocked culvert entrance, but they showed some minor deposition and sediment accumulation at the downstream culvert outfall (Photo 6, Attachment 2).

Overall, the access road culvert was rated 4—Severe Condition using the HydInfra methodology due to the evidence of bank erosion, slumping, and cavities forming at the upstream end, which may eventually threaten the integrity of the access road. MnDOT generally recommends structures with a rating of 4 be inspected annually to monitor progression and prevent damage to the roadway. The need for cleaning is not typically incorporated into the overall rating; however, in this case, because the upstream end is



100 percent blocked, without addressing the blockage, the roadway embankment may continue to erode from the bounce in water elevations upstream and through piping or cavitation around the culvert.

Recommendations

Based on the most recent site visit, the access road culvert shows evidence of joint separation and is completely blocked by sediment and debris, earning it a HydInfra rating of 4, which indicates serious deterioration. In addition to the recommendations given on September 14, 2022, Young Environmental recommends full, in-kind replacement of the culvert. If field conditions during reconstruction of the access road show that there is no joint separation as presumed during the October 2022 site visit, the condition of the culvert will be reevaluated at that time.











Attachments

- Figure 1—LMRWD Dredge Site Location Map
- Attachment 1—September 14, 2022, LMRWD Dredge Site Visit Summary
- Attachment 2—October 25, 2022, Photos of Access Road Culvert
- Attachment 3—Culvert Condition Assessment

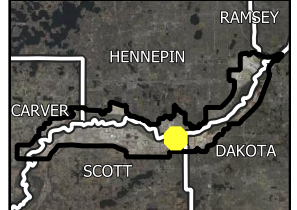
Figure 1: LMRWD Dredge Site Location Map



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|  LMRWD Dredge Site |  Major Highways |
|  LMRWD Boundary |  Railroads |
|  River Mile Markers |  Access Road Culvert |
|  Public Waterways |  Scott Co. Parcels |
|  Public Waterbodies |  County Boundaries |

LMRWD Location



Technical Memorandum

To: Linda Loomis, Administrator
Lower Minnesota River Watershed District

From: Katy Thompson, PE, CFM
Hannah LeClaire, PE

Date: September 14, 2022

Re: Lower Minnesota River Watershed District Dredge Site Visit Summary

As outlined in the Lower Minnesota River Watershed District's (LMRWD's) workplan to the Board of Water and Soil Resources, the LMRWD will implement capital improvement projects and continue the operation and management (O&M) of the Cargill East River (MN – 14.2 RMP) Dredge Material Site (Site) located on the Minnesota River in Savage, Minnesota (Figure 1). O&M activities include maintenance of Vernon Avenue and regular culvert cleaning. On August 22, 2022, Young Environmental staff visited the dredge site and documented the current site conditions in preparation for completing the specified O&M activities (Figure 2). The following documents the site conditions at the time and as provides an abbreviated background on the dredge site history.

Background

The U.S. Army Corps of Engineers (USACE) is required to maintain a nine-foot deep by 100-foot wide channel within the Minnesota River for barge navigation from its confluence with the Mississippi River to 14.7 miles upstream. While the USACE provides the needed channel dredging for navigation, the LMRWD serves as the local sponsor and is responsible for providing placement sites and the disposal of the dredged material. In 2007, the LMRWD acquired the land from Cargill, and in 2014 entered into an agreement with LS Marine, who also provides dredging services for the private slips at the nearby Ports of Savage, to operate the Site and find end users for the USACE dredged material on the LMRWD's behalf.

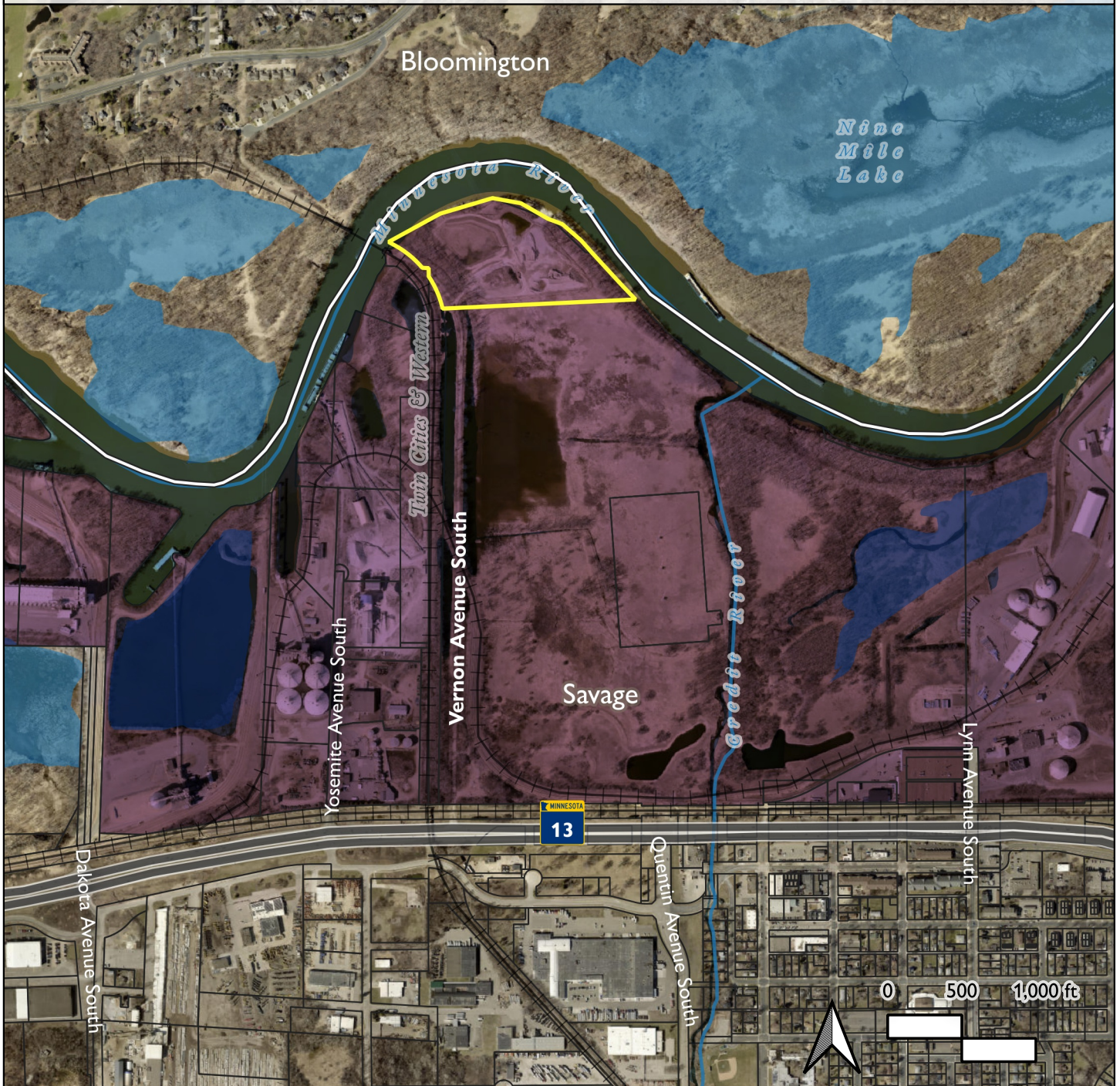
The LMRWD administrator provided the 2010 construction bid package for the Site access road developed by Bonestroo as well as a 2015 pavement evaluation report for Vernon Avenue completed by American Engineering Testing (AET). The Site access road was constructed over an existing drainage way to the Minnesota River and included a 48-inch reinforced concrete pipe culvert under the new roadway. The information provided does not show the pipe inverts; however, it appears that the pipe was placed on the existing grade and is flat, making it susceptible to sediment buildup at the entrance.

AET completed a pavement condition analysis of Vernon Avenue in June 2015 to determine if the roadway was adequate for haul trucks to remove the existing USACE dredged material stockpile on the Site. Four soil borings were collected along Vernon Avenue between Trunk Highway 13 and the Twin Cities & Western Railroad (TCWR). These borings established the roadway surface ranged from zero to 2.5 inches of deteriorated bituminous asphalt pavement. AET concluded the roadway was “in very poor condition,” the road was approaching its end of service life, and the pavement strength was not adequate for heavy truck loading (Figure 3).










As part of the planning and design efforts for the 2020 Site improvements, in 2017 Burns & McDonnell developed an Estimate of Probable Cost that estimated the cost to reconstruct Vernon Avenue to current design and strength standards was approximately \$125,000. The Estimate of Probable Cost, in addition to upgrading Vernon Avenue, recommended that the 48-inch access road culvert be cleaned out and be maintained on an annual basis, likely due to its flat slope. It was further recommended that the access road culvert be removed and replaced by 2026, with an estimated cost of \$103,000. It should be noted that Estimate of Probable Cost values are based on 2016 US dollars and an assumed 2.5 percent inflation rate. The estimates should be updated to reflect current construction costs if these capital improvements are pursued.

In 2020, the Site was improved to reconfigure the containment berms to segregate the sandy USACE dredged material and the more fine-grained and clayey private dredged material, which requires longer drying times. Since construction was completed, LS Marine has coordinated the placement and removal of approximately 24,000 cubic yards (CY) of USACE dredged material and 93,000 CY of private dredged materials.

Figure 1: LMRWD Dredge Site Location Map



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|--|---|
|  LMRWD Dredge Site |  Railroads |
|  LMRWD Boundary |  Scott Co. Parcels |
|  Public Waterbodies |  Ports of Savage Industrial District |
|  Public Waterways |  County Boundaries |
|  Major Highways | |

LMRWD Location

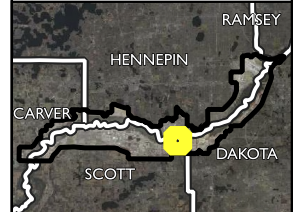
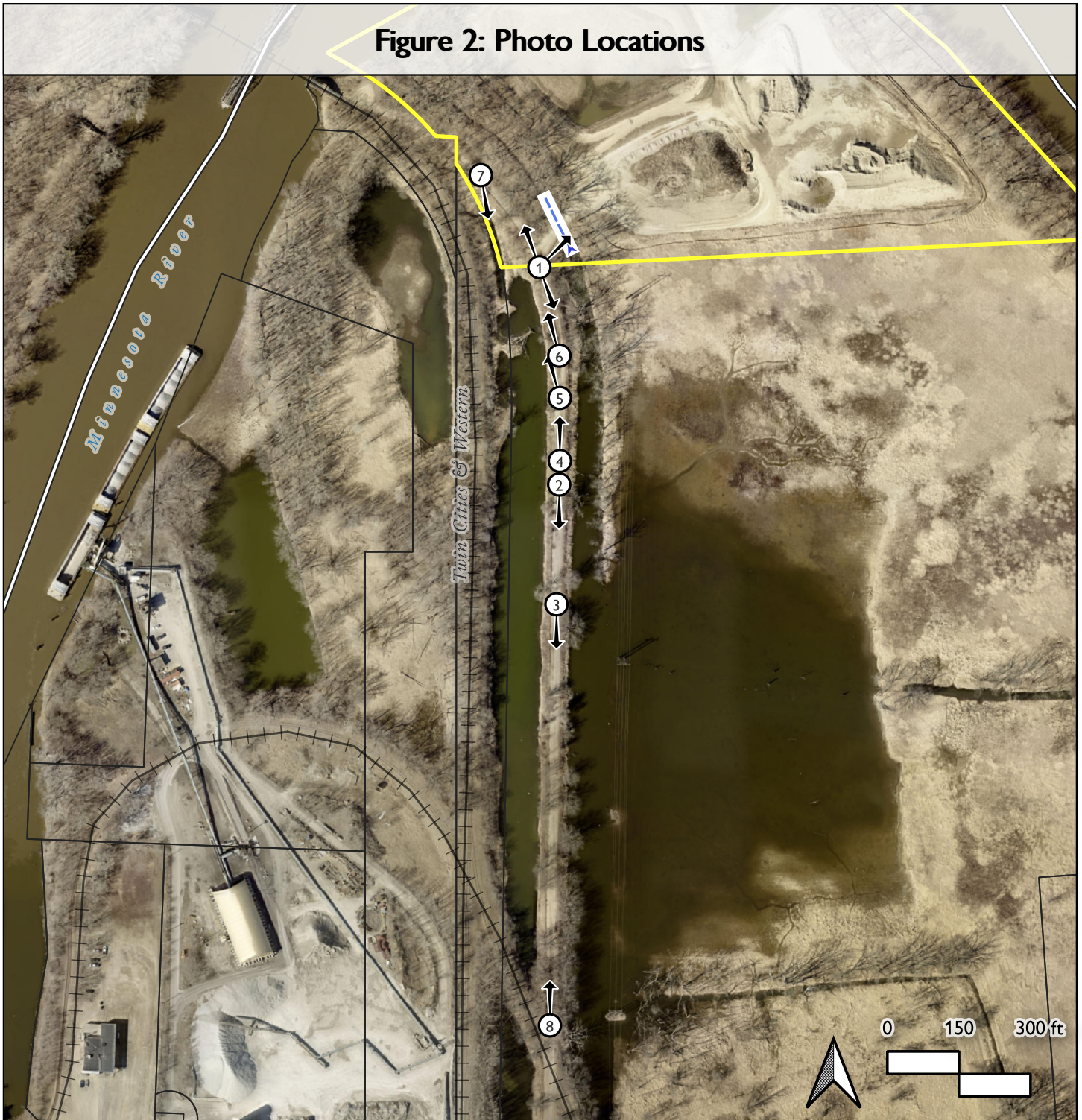


Figure 2: Photo Locations



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- August 2022 Site Visit Photo Locations (arrow indicates view direction)
- Access Road Culvert
- LMRWD Dredge Site
- LMRWD Boundary
- Public Waterbodies
- Major Highways
- Railroads
- Scott Co. Parcels
- County Boundaries

LMRWD Location

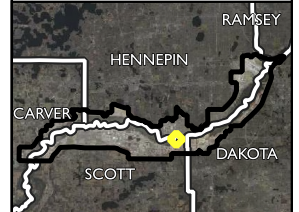




Figure 3. 2015 Vernon Avenue pavement condition (AET, 2015)

August 22, 2022, Field Visit

On August 22, 2022, staff from Young Environmental visited the LMRWD Site and reviewed the current conditions (Attachment 1). Unfortunately, heavy vegetation entirely obscured the access road culvert and most of the roadway embankment along Vernon Avenue (Photo 1A, Attachment 1).

Consistent with the background information reviewed, Vernon Avenue was in poor condition, with many deep ruts and a deteriorating road surface (Photo 4A, Attachment 1). Much of the roadway appeared to be sandy material overlaying a decomposed bituminous pavement (Photos 1B, 2B, 3B, and 4B, Attachment 1), but large sections of the roadway appeared to be entirely sand (Photo 3, Attachment 1). Due to the road's location within the Minnesota River floodplain, it is possible that the sandy material observed is may also be sediment deposition from past flood events, which may need further soil borings or review to confirm. When compared to Figure 3 and the 2015 AET report, the 2022 field conditions appear to indicate that Vernon Avenue has continued to deterioration.

Also consistent with LS Marine's maintenance concerns, there was evidence of road widening due to displaced aggregate (Photos 1C, 2A, 4A, and 5, Attachment 1). The road widening may be intentional turnouts from the 2015–2016 stockpile removal, which would have allowed the trucks hauling sediment offsite to bypass each other on the narrow road. It is also possible that because the road surface is in such poor condition, the aggregate placed by LS Marine is not properly secured in place and gets displaced from heavy truck traffic and rainfall. If this is the case, continuing to place aggregate to fill the ruts and depressions in the roadway does not appear to be a sustainable solution and could adversely affect the neighboring wetlands over time. LS Marine should be consulted to determine if the road widening was intentional or the result of further roadway degradation.

Next Steps

Following the review of the materials provided by the LMRWD administrator and completion of the site visit, we plan to move forward as follows:

- Conduct a follow-up site visit in mid to late October 2022 when vegetation has died back to properly assess the condition of the access road culvert and its maintenance needs.
- Following the October 2022 site visit, coordinate with LS Marine and City of Savage to discuss upgrades to Vernon Avenue and gauge interest in upgrading the road as recommended by AET in 2015.
- Use the LMRWD engineering pool to update the construction cost estimates and develop a pavement design to upgrade Vernon Avenue and the access road to current design standards, which will help prevent the amount of sediment and aggregate from entering the neighboring wetlands and the access road culvert.
- Work with the selected pool engineer to collect any needed field data (e.g., soil borings) in November and December 2022.
- Develop construction bid package over the winter–spring 2023 with possible construction summer 2023.

Finally, the Minnesota Pollution Control Agency recently provided the LMRWD with an updated assessment of sediment chemical concentrations for dredged material. The updated soil reference values were provided on August 25, 2022, and will be reviewed for potential impacts to the LMRWD's dredge operations. Results of the review will be shared at the next board meeting.

Attachments

Attachment 1—August 22, 2022, Field Visit Photographs

Attachment 1: Vernon Avenue Field Visit Photos

August 22, 2022

Photo 1A. LMRWD Dredge Site access road culvert (upstream, not visible due to dense vegetation)



LMRWD Dredge Site

LMRWD Access Road

Approx. location of 48-inch culvert

Photo 1B. Vernon Avenue looking north, from LMRWD Dredge Site access road. This portion of Vernon Avenue provides access to the Twin Cities and Western Railroad bridge and did not appear to be heavily trafficked. In 2015, the AET soil boring B-4 indicated the bituminous pavement was 1.5-inches thick but deteriorated.

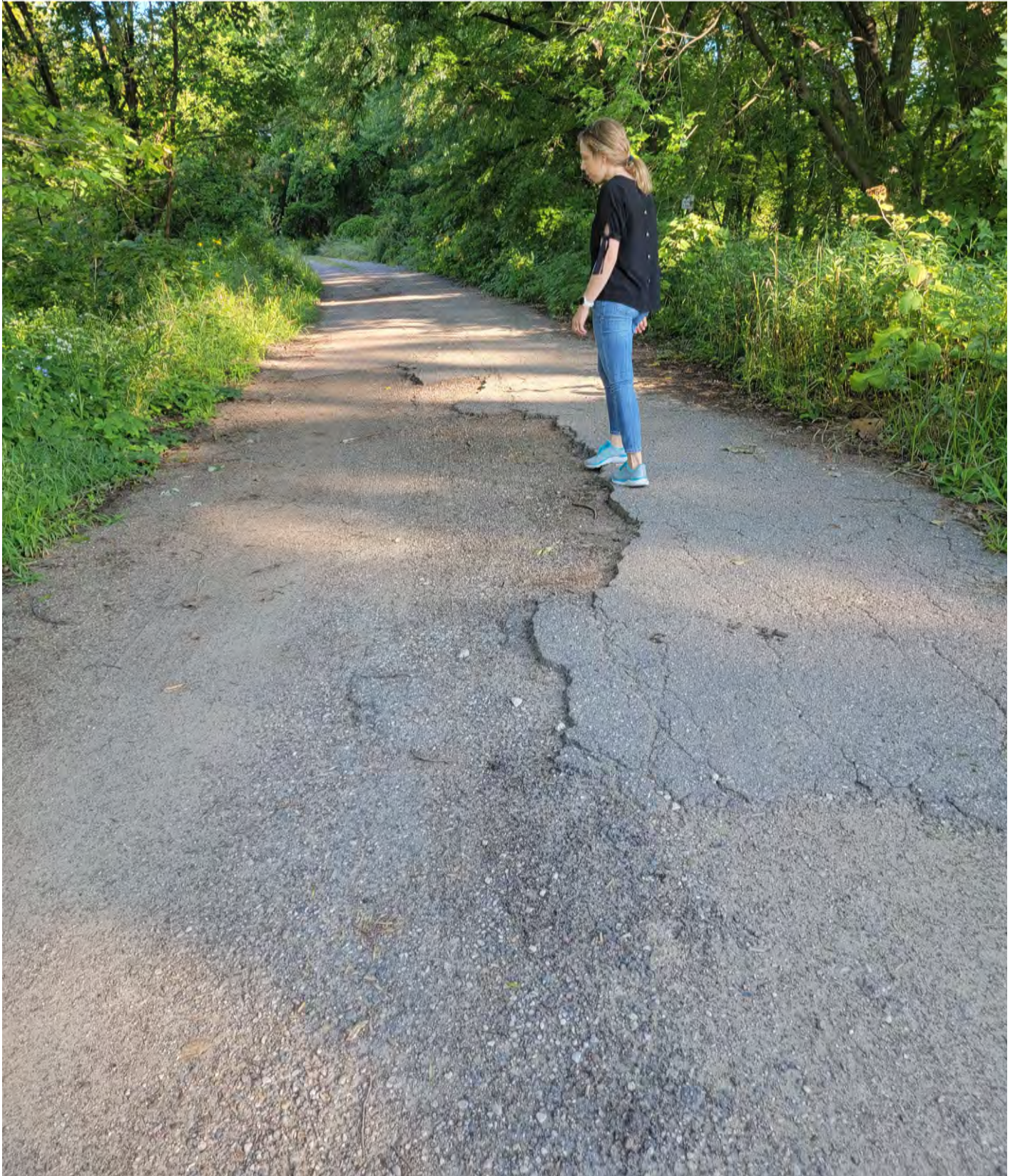


Photo 1C. Vernon Avenue looking south from dredge site access road



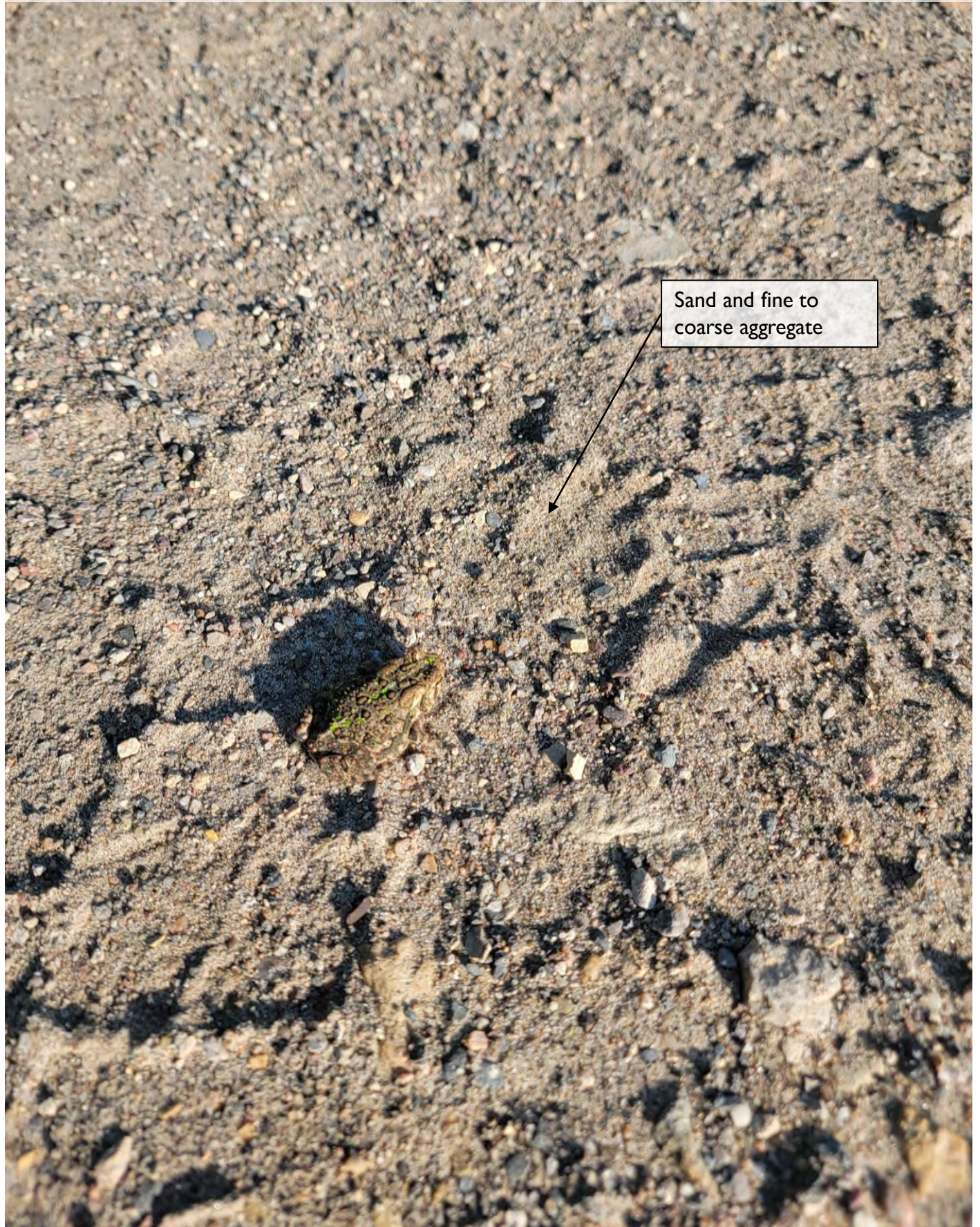
Photo 2A. Vernon Avenue looking south



Significant road settlement

Road widening likely due to displaced aggregate

Photo 2B. Frog and typical Vernon Avenue road surface near Photo 2 location



Sand and fine to coarse aggregate

Photo 3A. Vernon Avenue looking south. In 2015, the AET soil boring B-3 indicated the roadway was reduced to 0.25-inch chip seal layer atop 11.5-inches of sandy fill.



Photo 3B. Typical Vernon Avenue road surface near Photo 3 location

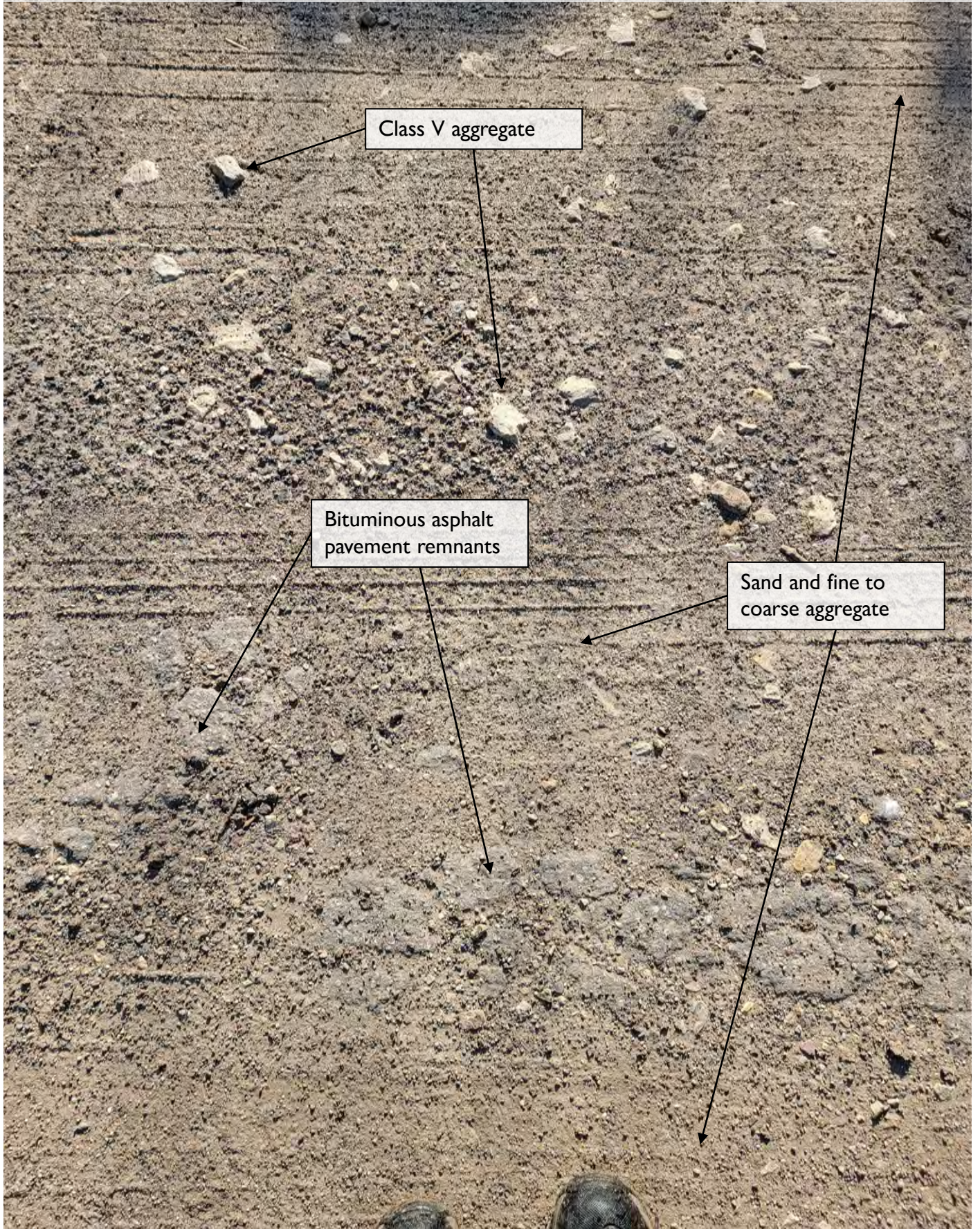


Photo 4A. Vernon Avenue settlement and rutting, looking north



Photo 4B. Close up of rutting and pavement condition, looking north



Photo 5. Vernon Avenue road widening and settlement, looking north



Road widening and displaced aggregate

Significant road settlement

Photo 6. Vernon Avenue widening and settlement, looking north



Photo 7. Vernon Avenue looking south at west wetland and heavy vegetation

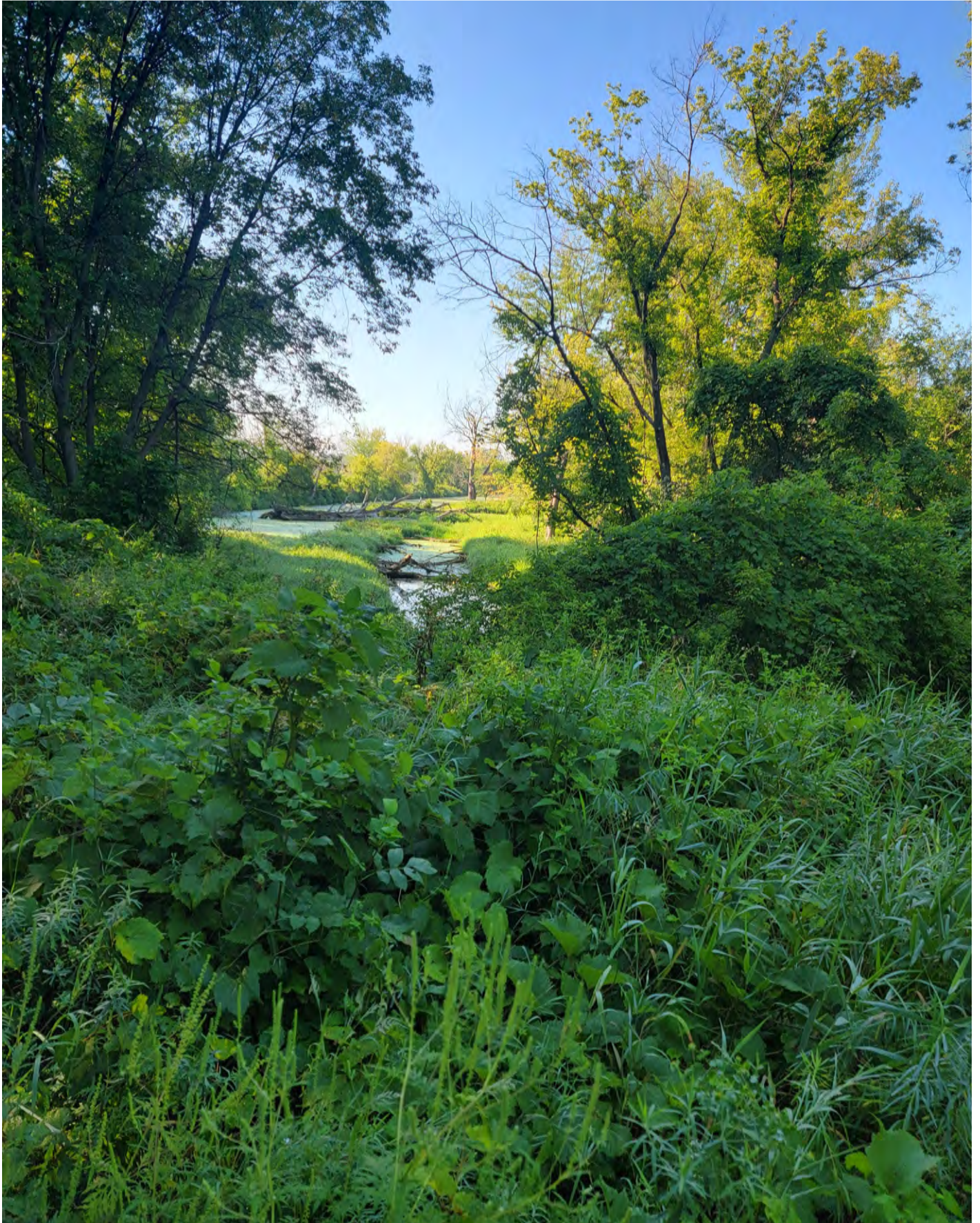
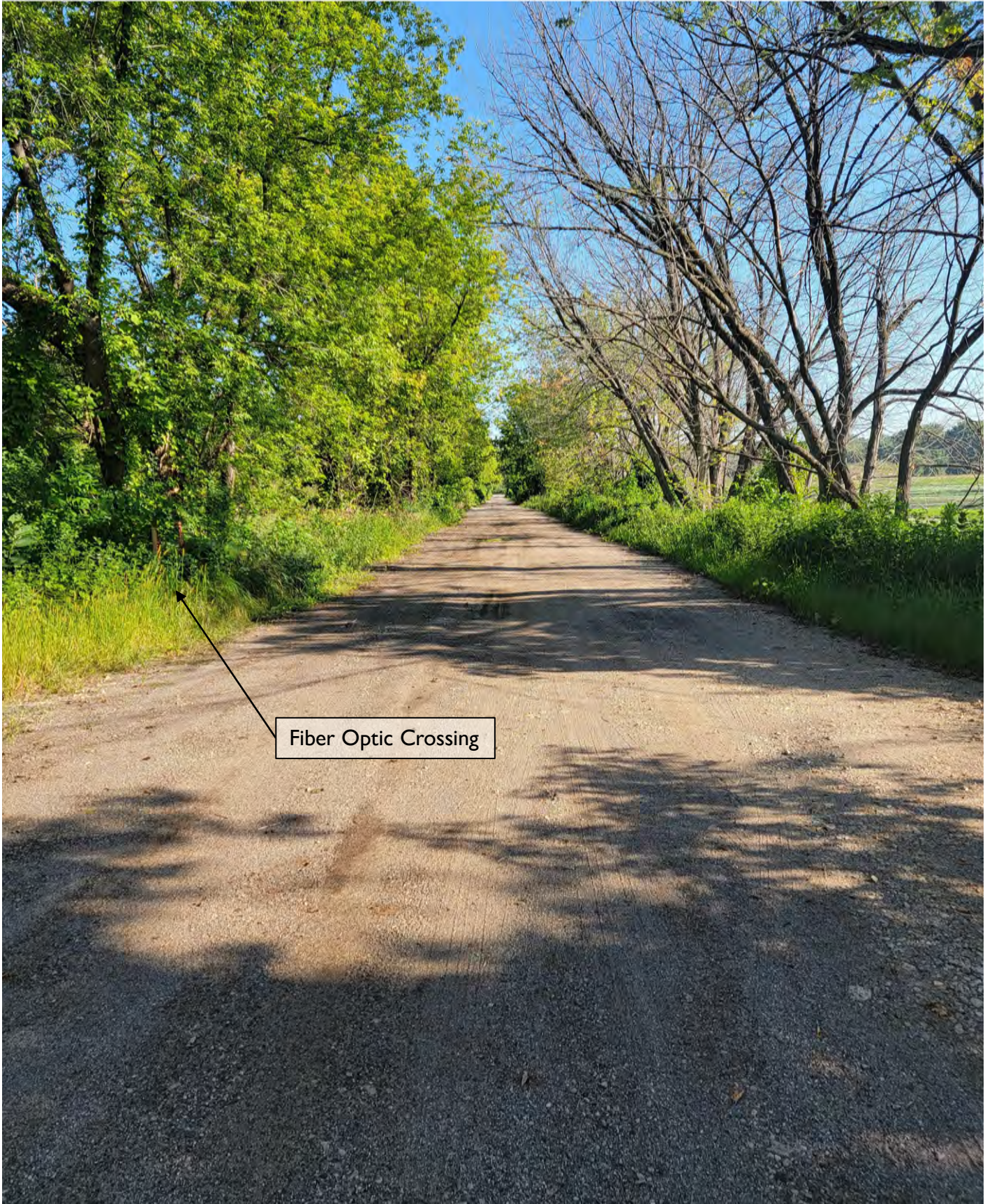


Photo 8. Vernon Avenue looking north from railroad crossing. In 2015, AET soil boring B-2 indicated the roadway had a 2.5-inch deteriorated bituminous pavement surface.

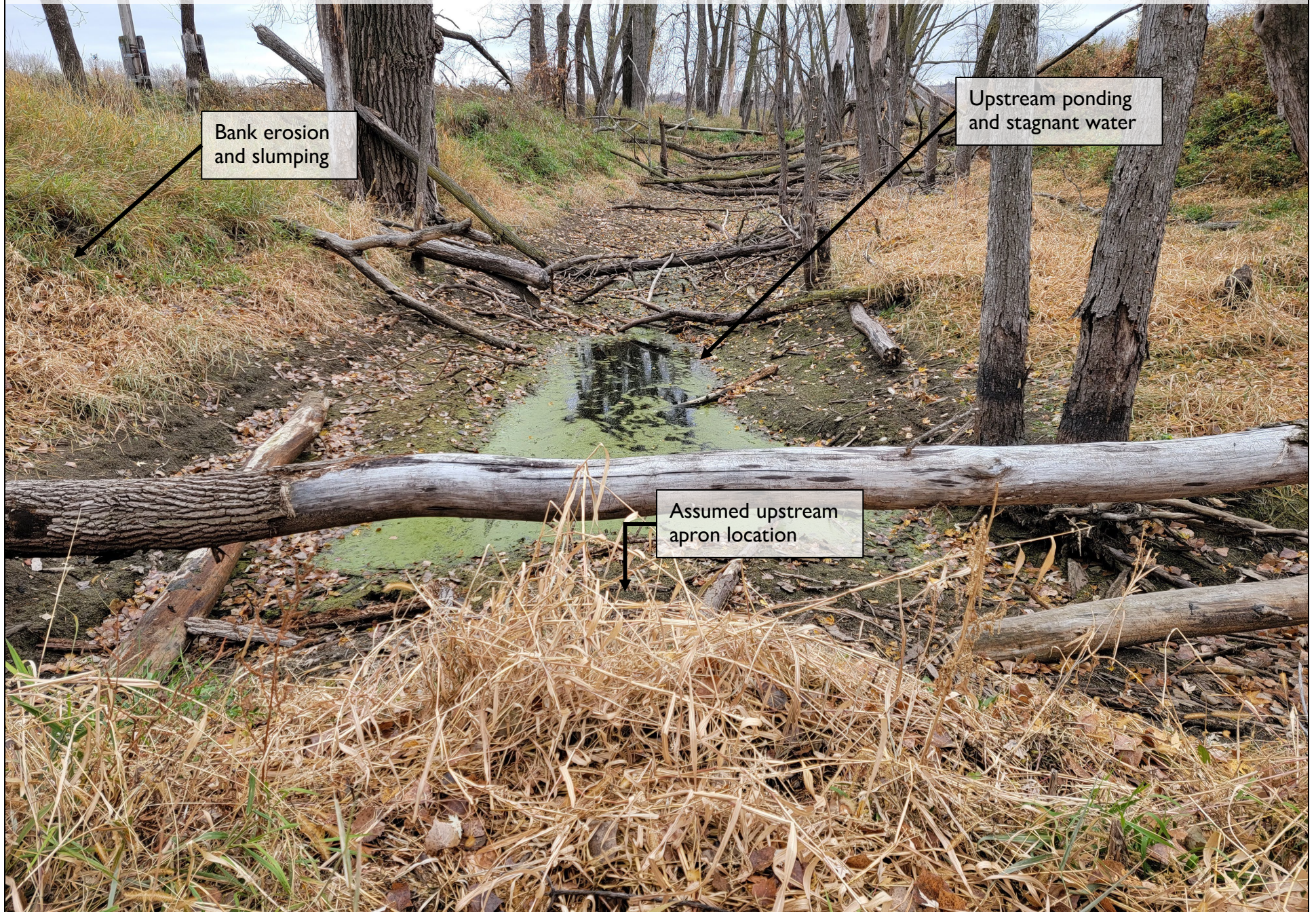


Attachment 2: LMRWD Access Road Culvert Conditions

October 25, 2022

Field observations made by Young Environmental (Katy Thompson and Erica Bock)

1. Looking south at upstream ponding area above the presumed culvert apron alignment.



Bank erosion
and slumping

Upstream ponding
and stagnant water

Assumed upstream
apron location



2. Looking north at upstream embankment from above the presumed culvert alignment at debris and inslope erosion.

3. Looking down at the presumed upstream culvert apron alignment and cavity forming in embankment.



Cavity forming above
presumed culvert alignment
at upstream embankment.



4. Looking west at downstream embankment, culvert outfall apron and trash guard, and left bank.



5. Looking upstream from the downstream culvert apron at pipe sedimentation (approximate culvert diameter shown with white dashed lines, approximate sedimentation shown in red).

6. Looking north at downstream channel from the downstream culvert apron.



Accumulated sediment and vegetation at apron outfall

LRMWD Dredge Site Culvert Condition Assessment

November 4, 2022

Pipe ID:	Access Road Culvert	
Condition Rating:	4 - Severe Condition	
Inspection Date:	10/25/2022	
Pipe Shape:	Round	
Material:	Concrete	
Length:	105-ft	
Diameter:	48-inch	
Cover:	Approximately 5-ft	
Maintenance Recommendations		
	Inspection Flag	Notes
Clean	Yes	U/S end buried
Plugged	Yes	U/S end buried; D/S approx. 30% full
Water Observed	Yes	Stagnant water at U/S inlet
Water Levels	Other	U/S FES buried, approx. 18-in of standing water and muck present
Structure Condition		
	Inspection Flag	Notes
Repair	No	Visible pipe appeared to be in good condition
Repair Under Road	No	-
Deformed	No	-
Standing Water	No	-
Infiltration	No	-
Silt Present	Yes	U/S plugged; D/S approx. 14-inches of sediment
Piping	No	-
Cracks	No	-
Spalling/Flaking	No	-
Pitting/Rusting	No	-
Separated Apron	Yes	U/S FES buried and inslope shows signs of slumping and cavities
Misalignment	No	-
Joint Separation	Yes	Potentially, given the signs of inslope failure at the U/S end
Holes	No	-
Roadway and Embankment Condition		
	Inspection Flag	Notes
Inslope Cavity	Yes	U/S FES buried and embankment shows signs of erosion, slumping, and small cave-ins
Road Void	No	-
Road Stress	No	-
Erosion	Yes	Embankment erosion on U/S side