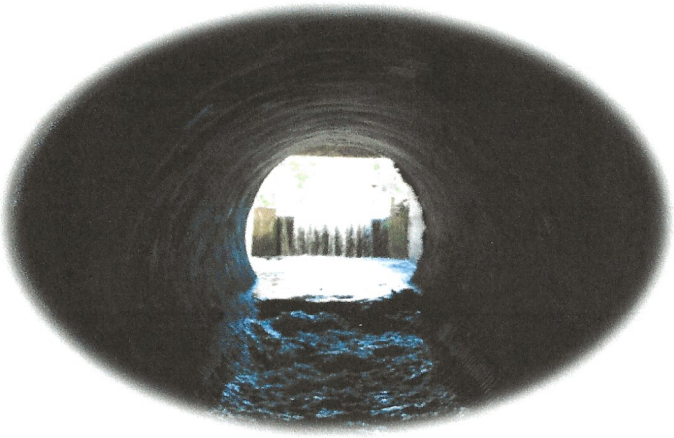
Barnes Lake Structure Inspection Report

Section 21, T.9N. – R.10E.
Deerfield Township, Lapeer County, Michigan
Located on Tributary to the North Branch of the Flint River



Prepared for:

Barnes Lake – Lake Improvement Board
C/O – Burns Rolland, Chairman
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Lapeer, MI 48446
brollandjr@charter.net

Prepared By:

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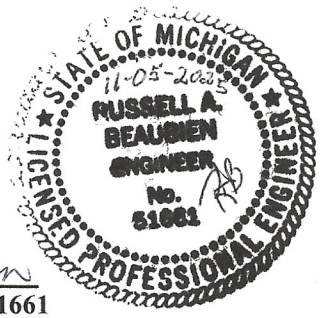
Inspected By:

Russell A Beaubien

Russell A. Beaubien, P.E., #6201051661



Date of Inspection: October 27, 2025
Date of Final Report: November 5, 2025

Project I.D. Number 2025-03

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I. INTRODUCTION

The Barnes Lake structure was inspected pursuant to a request from the Barnes Lake-Lake Improvement Board. This structure does NOT meet requirements of Part 315, Dam Safety, Natural Resources and Environmental Protection Act, Act 451 of 1994. The regulatory requirement for Part 315 Dam which is listed below as it appears in the regulations:

"Dam" means an artificial barrier, including dikes, embankments, and appurtenant works, that impounds, diverts, or is designed to impound or divert water or a combination of water and any other liquid or material in the water; that is or will be when complete 6 feet or more in height; and that has or will have an impounding capacity at design flood elevation of 5 surface acres or more. Dam does not include a storage or processing tank, or standpipe constructed of steel or concrete, a roadway embankment not designed to impound water, or a dug pond where there is no impoundment of water or waste materials containing water at levels above adjacent natural grade levels.

The elevation being referenced is a hydraulic height from the flowline and not the natural grade level which exists at this structure.

Russ Beaubien P.E., conducted an inspection of the structure on October 27, 2025, as requested by the delegated party responsible for the structure, Barnes Lake - Lake Improvement Board. The scope of this inspection is to identify conditions that constitute an existing or potential hazard to the structure. The identification of potential hazards is limited to the field visual inspection, review of previous reports, and a general flow computation. The contents of this report are not to be treated as a detailed engineering evaluation, it is just an inspection of conditions observed on this site visit.

The FEMA National Dam Safety Program Office asked all states to begin providing a condition assessment for each of their regulated dams. At the beginning of 2010, the State of Michigan instituted new dam safety inspection report requirements under Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). This inspection report will serve as a baseline for future inspections to be performed on the structure. A summary of the inspection of the structure is outlined in the Project Information section of this report. All references regarding the orientation of the structure shall be made as viewed looking downstream. To facilitate the assessment of conditions, the National Dam Safety Review Board established the following categories which will be used as a standard during this report:

The terms **satisfactory, fair, poor,** and **unsatisfactory** will be used to describe the conditions of the structure. The following is a brief definition of each term.

SATISFACTORY

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.

FAIR

No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and /or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

POOR

Dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency: further investigations and studies are necessary.

UNSATISFACTORY

Dam safety deficiency is recognized which requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary until problem resolution.

II. CONCLUSIONS AND RECOMMENDATIONS

A. Overall Condition

Visual inspection of the structure indicates the structure is in satisfactory overall condition. However, there are a few minor deficiencies that should be monitored and/or corrected. The following list is a summary of the areas of concern that were observed during the visual inspection.

B. Observed Deficiencies/Prioritized Recommendations

Specific deficiencies and recommended corrective measures, listed in order of priority, are as follows:

1. The concrete on the upstream portion of the box culvert has spalling and some cracks. Photos 2, 3

Recommend: Monitor the spalling and cracks annually, by taking pictures to have a long-term photographic record of the spalling and cracks. Ask the County Road Commission to send an engineer to assess the concrete of the structure. Show them pictures from previous inspection reports. This will provide a better understanding of the conditions for future action plan.

2. The wooden stoplogs had wood placed along the edge of the weir to block flow. This may have been natural or placed purposely.

Recommend: Remove materials placed to block flow, educate the lake residents to not place items which block flow of the weir at this structure. Monitor the condition of the stoplogs annually. If they are to be replaced use white oak, rough cut boards of same dimensions. It is recommended that these stoplogs be replaced as they are eroding along grain lines and will be weakening over time. A plan should be developed to replace these stoplogs before they fail and cause an "unscheduled and un-permitted" lowering of the lake level which would be a violation of P.A. 451 of 1994.

3. There is corrosion on the bottom of the 72-inch corrugated metal pipe (CMP) outlet pipe.

Recommend: Monitor the corrosion, determine a time frame when the pipe can be either coated or re-lined during a dry period with an epoxy or plastic coating to extend its lifetime. Note that the life span of CMP is approximately 50-yrs. This pipe is nearing that age. However, the corrosion is not that significant yet, but it is present.

4. Connection point between the concrete box culvert and the CMP pipe. Photos 4 - 8

Recommend: Monitor this connecting point annually. See above for the comment on a road commission inspection.

5. There is a large dead ash tree which has fallen diagonally across the stream just downstream from the culvert outlet. Photo 13

Recommend: Removal of the tree and leave the roots (if possible) to ensure the bank on the west side does not erode badly.

6. There is active stream embankment undercutting happening downstream of the CMP outlet on the west side. This is being caused by the placement of large rocks which is directing the flow into the embankment causing it to be undercut, this will cause an eventual bank failure and widening of the stream in the direction of the roadway which can cause future issues with the road.

Recommend: Removal of the rocks and direct the stream flow towards the middle of the stream and away from the banks. When facing downstream, we are referring to the right streambank.

7. There appears to be erosion along the right center of the road as one faces towards Barnes Lake Road. A plan should be developed to determine how to protect the road and shoulders of the road from erosive flows coming from upgrade areas of the roadway. Photos 14, 15

Recommend: Consider asking the Road Commission to review this site for erosion control and flow direction capture.

No other significant deficiencies or maintenance issues were noted.

C. Further Detailed Studies and/or Investigations

At this time, we do not recommend any further investigation of the structure, other than the recommendation for the County Road Commission to assess two of the items listed above. Also, the visual inspection is recommended every five years by an engineer and periodic inspection by the Barnes Lake Improvement Board.

D. Hazard Potential Classification

The hazard potential classification of the structure. Based on the inspection, if this was an actual dam it would classify as a LOW hazard dam. The hazard potential classification is only an indication of the potential for loss of life and economic loss due to failure of a dam. It is our opinion that the hazard potential classification of "Low" for this structure is appropriate. The hazard potential is not an indication of the structural stability or integrity of the structure.

III. PROJECT INFORMATION

A. Purpose of the structure

The Barnes Lake structure was constructed to stabilize the lake level for Barnes Lake's residential development purposes. The lake also serves recreational purposes such as water recreation and fishing.

B. Previous Inspection Reports

This is the fourth inspection of this structure, including this report. These previous reports were initiated by a request to the Lapeer County Drain Commissioner, who then asked the company known as Spicer Group, Inc. to inspect the structure. These inspections were not part of any regulatory requirement at the state level.

- *2006 – Spicer Group, Inc.*

- *2014 – Spicer Group, Inc.*
- *2020 – Spicer Group, Inc.*

IV. FIELD INSPECTION

Russ Beaubien P.E., performed a visual inspection of the structure on October 27, 2025. Photographs were taken and a field inspection checklist was completed in the field and home office summarizing the inspection. The checklist and photographs are included in the Appendix of this report. The following is a summary of the visual observations made during the inspection:

A. There were no visible depressions, sinkholes, earthen bulging, sloughing, slides, slumps, cracks or alignment issues observed on the earthen structures during this inspection.

B. The wood used as the stoplogs in the weir are eroding along their exposed grain lines. Photo 20.

C. The concrete of the former bridge structure has some spalling, exposed re-rod, and cracks on the upstream face. Photo 3

D. There is some deterioration at the connection between the concrete structure and the 72-inch CMP which needs to be monitored. Photos 4, 5, 6, 7, 8,

E. There was a rock flow blocking structure downstream of the outlet pipe which is directing flow to the right-side bank causing it to be undercut which will lead to bank failure in the future if not corrected.

F. There is a dead ash tree diagonally across the stream downstream of the culvert outlet. Photo 13

G. The outlet pipe appears to be in satisfactory condition with minor corrosion along the flowline.

H. The outlet pipe has minor corrosion on its flowline but this has not changed significantly since the 2020 inspection.

I. Wingwalls and sheet piling appear to be in satisfactory condition

V. STRUCTURAL STABILITY

The overall structural stability of the dam is satisfactory, based on visual inspection. The embankments show no signs of immediate potential failure. The outlet pipe is in satisfactory condition. The natural surface outlet channel appears to be in satisfactory condition. The concrete and sheet piling of the upstream structure is in satisfactory condition. The wood in the stoplogs of the weir are in fair condition.

VI. HYDROLOGY AND HYDRAULICS

A. Discharge on day of inspection.

On the day of the inspection there was 9 inches of flow from the 72-inch CMP which calculated out to approximately 12.1 cfs or 5,420 gpm.

B. Existing Spillway Capacity.

The flow out of Barnes Lake was determined to be approximately 162 cfs or 72,700 gpm with the pipe flowing full and approximately 1 foot of head. This calculation is from the 2020 report.

APPENDIX A

2025 STRUCTURE INSPECTION CHECKLIST

DAM INSPECTION WORKSHEET AND CHECKLISTS	
	N/A = Not Applicable
GENERAL INFORMATION / DESCRIPTION	
Name of Dam:	Barnes Lake – Lake Level Control Structure
Dam Identification Number	Not regulated under Part 307 or 315 of PA 451 of 1994
Project Number:	25-03
County:	Lapeer
Township	Deerfield Twp
Town - Range:	T.9N. – R.10E.
Quarter Section of Section:	Section 21
Impounded Lake, Stream, or River:	Barnes Lake
Height of Dam:	N/A
Length:	N/A
Outlet Pipe(s) Size:	72-inch CMP
Normal Head on Dam:	~4 feet
Impoundment Size:	~110 acres per MichiganLakes.com ~147 acres per studies by PEC of Grand Rapids and Clarke Aquatic Services 2022 WMP
Maximum Storage Capacity:	Not available
Normal Storage:	Not available
Purpose of Dam:	Lake Level maintenance – year around
Owner:	Barnes Lake Association maintains it
Contact Name:	Burns Rolland – representing Barnes Lake – Lake Improvement Board
Owner Address:	742 Mountview Road
	Lapeer, MI 48446
	brollandjr@charter,net
Owner Phone Number:	810-728-0980
Operator:	
Contact Name:	
Operator Address:	
Operator Phone Number:	
Hazard Potential Classification: (Circle 1)	**Not applicable, Not regulate – no hazard rating**
Emergency Action Plan (EAP) Required?	**Not applicable as this structure is NOT regulated under PA 451 of 1994 NREPA**
Is there an existing EAP?	N/A
Name of the Emergency Coordinator:	
Emergency Coordinator Address:	

Emergency Coordinator Phone Number:	

DAM INSPECTION CHECKLIST/ OWNER INTERVIEW		
Date of Inspection:	10/27/2025	
Photographs:	Yes	
Tie down stationing along top of dam:	N/A	
	U/S = Upstream D/S = Downstream **N/A = Not applicable N/R = Not required**	Observed Deficiencies
FIELD INSPECTION		
EARTH EMBANKMENT		
A.) Settlement		
1.) depressions	None observed	
2.) sinkholes	None observed	
3.) ruts and paths	None observed	
B.) Slope Stability (upstream/ downstream slopes)		
1.) Irregularity in alignment	None observed	
2.) Movement	None observed	
a.) sloughing	None observed	
b.) cracks	None observed	
c.) slides	None observed	
d.) slumps	None observed	
e.) beaching	In front of weir	
C.) Slope and Crown Protection		
1.) Vegetative Cover	Shrubs and plantings for erosion control	
2.) Trees and brush	Some small trees on downstream slope	
3.) Erosion From Surface Runoff	Noted erosion on road surface	
4.) Wave protection	Concrete wingwalls and sheet piling U/S	
D.) Seepage, Boils, Piping		
1.) At contact points with all concrete structures	Inside of box culvert at its connection to CMP, evidence of seepage from above road surface	
2.) Along downstream slopes	None observed	
3.) Along downstream toe	None observed	
4.) Potential seepage areas		
a.) trees	Small trees on D/S slope	
b.) animal burrows	None observed	

*Number observed deficiencies from most critical to least critical (most critical being No. 1)

5.) Drainage Systems		
a.) toe drains	None observed	
b.) filters	None observed	
c.) ditches	In 2020 noted 2 CMP tubes by structure on NE side which were plugged with debris, Could not see these tubes during this visit.	7
SPILLWAY AND OUTLET WORKS		
	Flow depth – stoplogs 3.625”; 72” pipe has 9 inches of flow	
A.) Hydraulic Capacity		
1.) Principal Spillway	6-ft x 8-ft Box culvert to 72-inch CMP	
2.) Auxiliary Spillway		
3.) Powerhouses	None present	
4.) Other diversions or outlets, withdrawals	None Present	
B.) Control Gates & Operating Mechanisms		
1.) Structural Members	None Present	
2.) Connections	None Present	
3.) Hoists	None Present	
4.) Cables	None Present	
5.) Power Supply	None Present	
6.) Gate Seals	None Present	
C.) Stop Logs and Stop Log Channels		
1.) Leakage	Unable to determine based on flow over weir	
2.) Deterioration	Present, grain is eroding from wood	5
3.) Corrosion	minimal	
D.) Obstruction to Flow		
1.) Approach Channel	Clear	
2.) Trash Racks	None	
3.) Outlet Channel	Clear, but there is a dead ash tree across channel above flow of creek	6
4.) Sedimentation		
E.) Drawdown Facilities		
1.) Operation	No drawdowns	
F.) Energy Dissipation		
1.) Stilling Basins	Just downstream of stoplogs in box culvert	
2.) Plunge Pools	D/S of stoplogs	
3.) Baffles	none	

*Number observed deficiencies from most critical to least critical (most critical being No. 1)

4.) Sills & Spillway Aprons	Below weir is a concrete sill	
5.) Erosion Protection	Concrete, stream cobble	

G.) Pipes		
1.) Joint Separation	None observed	
2.) Leakage	None observed	
3.) Protective Coatings	None	
4.) Settlement	None observed	
5.) Displacement	Not really any displacement observed	
CONCRETE & MASONRY STRUCTURES		
A.) Surface Conditions		
1.) Spalling	Noted at entry to box culvert, exposed re-rod	2
2.) Cavitation		
3.) Cracks	Present, however, have not changed significantly over the past 5 yrs	2
a.) Displacement and Separation	None observed	
b.) Seepage	None observed	
4.) Efflorescence	Minor	
B.) Joints (Monolith)	Box culvert is connected to round CMP	
1.) Sealant or Fillers		
2.) Movement		
3.) Seepage	Yes, noted siltation from road bed at CMP/Concrete culvert connection point	
OPERATION AND MAINTENANCE		
A.) Operation		
1.) Seasonal or Fluctuating Pond Levels	Varies with seasonal hydrology	
2.) Operation Records		
3.) Periodic Drawdowns	None	
4.) Instrumentation	None	
B.) Maintenance		
1.) Repairs		
2.) Periodic Maintenance		
a.) Wood	Plan should be made to replace stoplogs in the next 5 years	1
b.) Metal	Monitor corrosion on flow line of CMP	3

*Number observed deficiencies from most critical to least critical (most critical being No. 1)

c.) Concrete	Monitor cracks, have road commission examine these for their records.	2
d.) Soils	Monitor erosion on slopes	4
e.) Electrical	None Present	
f.) Mechanical	None Present	
3.) Operation and Maintenance Plan	Inspection by engineer every 5 yrs – recommended but not required by Dam Safety Rules & Regulations of EGLE	
4.) Site Security	None	
C.) Emergency Action Plan	N/A	
1.) Warning systems		
2.) Notification Networks		
GENERAL AREAS		
A.) Reservoir		
1.) Unique Features	None	
2.) Dead trees, debris in reservoir	No, but logs at entry to weir, blocking flow	
B.) Shoreline		
1.) Erosion	On road surface	
2.) Vegetation	established	
3.) Wave Protection	Concrete wingwalls and steel sheet piling	
C.) Upstream Watershed		
1.) Historic Development	Residential and recreational	
2.) Present Development	Residential and recreational	
3.) Proposed Development	Residential and recreational	
D.) Downstream Floodplain		
1.) Flood Protection	Downstream floodplain in wetland area	
2.) Historic, present, proposed development	Floodplain, unknown	
3.) Channel restrictions	None observed	
E.) Structural Stability		
1.) Embankment	Satisfactory	
2.) Weir structure (wood)	Fair	
3.) Outlet structure concrete / pipe(s)	Satisfactory	
4.) Overall	Satisfactory	
Further Detailed Studies?	No	

*Number observed deficiencies from most critical to least critical (most critical being No. 1)

If yes, explain		
GENERAL COMMENTS/OVERALL CONDITIONS	Satisfactory	
Recommend Changing Hazard Classification?	**THERE IS NO HAZARD RATING**	
DAM INSPECTION PREPARATION CHECKLIST		
Requested / Received information from EGLE?	Not applicable (N/A)	
Construction Plans, specifications,	N/A	
Operations and Maintenance records,	N/A	
Design Calculations, Any Information	Road Commission design of culvert	
Requested/ Received from OWNER?		
Construction Plans, specifications,		
Operations & Maintenance records,	None	
Design Calculations, Any Information		
Set Date of Inspection with owner?	Yes	
Weather, Owner Availability?	Partly cloudy, snow earlier, temp 23 F.	
Operation of Gates/ Outlet Works?	No	
What special instrumentation will be necessary?	No	
Piezometers, Alignment Markers		
Benchmarks, Established Elevations		
Equipment:		
Survey (level or hand level, tripod, level rod):	X	
Measuring equip. (tapes, rules, sounding lines):	X	
Marking Paint/ Keel	X	
Paper/ Pencil	X	
Calculator	X	
Scale	X	
Map	X	
Measuring Wheel	X	
Seepage (bucket and timer)		
Camera/ Film	X	
Binoculars		
Probe (undercutting) / Level Rod	X	
Rubber Boots, Waders	X	
Survey Field Book	X	
File Folder	X	
Boat		
Shovel	X	
Hammer	X	
Crack measuring device	X	

*Number observed deficiencies from most critical to least critical (most critical being No. 1)

Specialized Equipment (piezometers, etc.)	
Safety Equipment:	
Life Jacket	
Hard hats	X
Steel toed shoes	X
Lights	X
Interview with Owner	Yes
Comments, Date	Burns Rolland on site 10/27/2025
	And Darren
Inspection Checklist/ Forms	X
POST INSPECTION CHECKLIST	
Interview with Owner/ Operator	On site
Insure everything on inspection checklist is answered	Yes
Call Emergency Coordinator	N/A
What is needed in EAP for the County?	
Schedule a meeting with Owner and coordinator	
Prepare preliminary EAP (see EAP form)	
Inundation map	
List of possible flooded facilities, structures, etc.	
Time frame of flood wave	
Meeting with Emergency Coordinator and owner	
Final EAP	N/A
Make revisions per results of meeting	
Preliminary Structure Inspection Report Draft	
Preliminary Dam Inspection Report	N/A – not to be submitted to EGLE so this step is not necessary
Submit preliminary dam inspection report to owner	N/A – not to be submitted to EGLE so this step is not necessary
Final Structure Inspection Report	November 5, 2025
Make revisions per owners request, if any	Updated area of Lake

*Number observed deficiencies from most critical to least critical (most critical being No. 1)

APPENDIX B

SITE LOCATION MAP

Barnes Lake Structure Latitude 43.189286° Longitude -83.308347°

APPENDIX C

PHOTOGRAPHS

1. Inlet of weir structure in Barnes Lake

2. Spalling and cracked concete along headwall of structure

3. Spalling, cracked concrete and exposed re-rod along structure. When compared to pictures from the 2020 inspection, not much change.

4. Where concrete structure connects to corregated metal pipe (CMP) in structure

5. Right side of attachment note sediment spilling down headwall bags.

6. Cracking and sedimentation on right side of CMP

7. Crack in concrete on top of CMP

8. Crack in concrete towards right side of CMP. Compare with 2020 pictures

9. Exposed rerod in concrete box culvert about 3-ft inside of the structure

10. Outlet CMP looking downstream.

11. Downstream to floodplain

12. Looking at downstream slope of road

13. Dead ash tree diagonal across outlet stream.

14. Road surface looking northward. Note erosion left of middle of road.

15. Gully erosion in road surface from previous runoff events.

16. East side of roadway, with well established vegetation & shrubs to prevent erosion

17. Approach channel to structure

18. Concrete wing wall of structure.

19. Southwestern embankment above steel sheet pile, with well established vegetation for erosion protection.

20. View of top weir stoplog showing the erosion of the wood grain.

21. Woody debris removed before arrival of inspector.

22. There were 2 small diameter CMPs here during the 2020 inspection, not visible now during this inspection. See 2020 report for picture comparison.

APPENDIX D

FLOW CALCULATION FOR 72-INCH CMP

Manning Formula Uniform Pipe Flow at Given Slope and Depth

Flow in 72 inch CMP - 9 inches

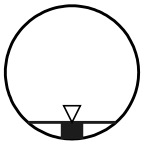
Printable Subtitle

Inputs

Pipe diameter, d_0	72	in
Manning roughness, n	0.024	
Pressure slope (possibly ? equal to pipe slope), S_0	0.025	rise/run
Relative flow depth, y/d_0	12.5	%

Results

Flow depth, y	9.0000	in
Flow area, a	293.7466	sq. in.
Pipe area, a0	4071.5122	sq. in.
Relative area, a/a0	0.0721	fraction
Wetted perimeter, P_w	52.0369	in
Hydraulic radius, R_h	5.6450	in
Top width, T	47.6235	in
Velocity, v	5.9211	ft/sec
Velocity head, h_v	6.5387	in H2O
Froude number, F	1.46	
Average shear stress (tractive force), tau	0.7342	psf
Flow, Q (See notes)	12.0781	cfs
Full flow, Q0	362.6788	cfs
Ratio to full flow, Q/Q0	0.0333	fraction



Notes:

This is the flow and depth inside an *infinitely long* pipe.
Getting the flow into the pipe may require significantly higher headwater depth. Add at least 1.5 times the velocity head to get the headwater depth or see my 2-minute tutorial for standard culvert headwater calculations using HY-8.