



Report of:

2021 Lake Lemon Dam Inspection

Unionville, Indiana

Prepared for:

Lake Lemon Conservancy District

7599 North Tunnel Road

Unionville, Indiana 47468

DLZ Indiana, Inc.

138 N. Delaware Street

Indianapolis, IN 46204

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DLZ Job No. 2163-5057-70

March 2021

Prepared by:





INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

REPORT OF: 2021 LAKE LEMON DAM INSPECTION

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1.0 INTRODUCTION

The Lake Lemon Conservancy District requested DLZ Indiana, Inc. (DLZ) perform a field inspection of the Lake Lemon Dam. The Lake Lemon Dam is located near Unionville, Indiana in Monroe County. On March 8th, 2021, the inspection of the dam embankments and spillways were performed by DLZ staff.

2.0 PROJECT INFORMATION

2.1 General

The Lake Lemon reservoir was constructed in the 1950's and its primary function at that time was to provide the City of Bloomington its primary source of drinking water. The reservoir is used today for recreation and as a secondary source of drinking water supply for the City of Bloomington. The normal pool area is approximately 1,700 acres and is located within portions of Monroe and Brown counties. The reservoir's watershed covers approximately 71 square miles.

The dam's earthen embankment is roughly 50 feet high with a crest length of approximately 660 feet. The crest width is approximately 13 feet, and the upstream and downstream slopes are inclined at approximately 1:Vertical to 3.5:Horizontal. All references to locations on the dam and spillways assume the reference point is from the reservoir and facing the upstream dam face. The principal spillway is a 329-foot long, concrete ogee-type overflow structure. The principal spillway is in a valley northeast of the earthen embankment. The auxiliary spillway consists of a 42-inch diameter reinforced concrete pipe near the left abutment from its inlet to the outlet via a gatewell. Flow through the pipe is controlled by a slide-gate located within the fenced in gatewell. The pipe discharges into a stilling basin near the downstream toe of the dam. The dam embankment and spillway location map are presented in **Appendix I**.

Photographs taken during the 2021 inspection and a Photograph Index Map can be found within **Appendix II**. This report contains all the observations and recommendations resulting from the 2021 inspection. The previous inspection report from 2019 was also reviewed as part of the inspection. The completed IDNR Dam Inspection Report for the 2021 inspection is presented in **Appendix III**. Additionally, the 42" outfall inspection report by L& M Fab Tech has been included in **Appendix IV**. (Note that the outfall inspection was completed independently from DLZ's inspection. The L&M report is added here as a courtesy and at the request of the Conservancy District.)

2.2 Recent Maintenance Activities

In the 2019 Inspection Report, recommendations were made for additional monitoring and maintenance. It is understood that riprap has been added to the bank of the eastern abutment of the principal spillway in order to prevent erosion. Additionally, riprap has been placed downstream of the sluiceway to reduce scour.

2.3 Security

The access to the dam embankment is along a private drive with a locked gate. The lake manager has access to this lock, as does the City of Bloomington Utilities. While the embankment, principal spillway, and south end of the auxiliary spillway have no public access, there is public access to the north end of the auxiliary spillway structure at Spillway Road.

3.0 FIELD INSPECTION

Weather conditions during the inspection were partly cloudy. The high temperature of the day was 64°F. The inspection was completed on March 8 with the previous rainfall for the Bloomington area showing 1.70 inches on February 28, 2021.

3.1 Embankment

There were no serious problem areas in the physical condition of the embankment found by DLZ. The slopes were relatively uniform. Grass and vegetation on the embankment slopes and crest had been mowed. The lake supervisor stated the embankment is typically mowed two times a year. The only identifiable depression is a shallow flow path along the downstream slope. This area should be monitored to ensure no further depression or erosion is created.

There were signs of two animal burrows present during the inspection. Burrows should be filled with well compacted material. If burrows cannot be readily filled with compacted soil, Portland cement grout can be poured into burrows to remediate them. The embankment should be regularly monitored for animal burrows because they can create seepage pathways if not filled.

3.2 Principal Spillway (East)

The principal spillway did not change significantly since the last inspection. The previous inspection noted minor displacements of ½ to ¾ inches at joints located at the spillway. There appeared to be no significant changes in the joint displacements since the 2019 inspection.

Erosion at the downstream toe of the spillway could not be verified at the time of inspection due to the amount of water flowing over the spillway. The addition of riprap along the outside bank of the eastern abutment has prevented additional erosion since the previous inspection report. No new requirements are needed on this bank.

3.3 Auxiliary Spillway (West)

The visible portions of the auxiliary spillway appeared satisfactory and the stilling basin conditions appeared to remain unchanged from previous inspections. Previously scoured areas downstream of the sluiceway are backfilled with properly-sized riprap as was recommended in the previous inspection report.

4.0 CONCLUSIONS

Based on our observations, it appears the dam facility condition has not changed significantly since the 2019 inspection. The overall surficial condition of the project was determined to be “Satisfactory.”

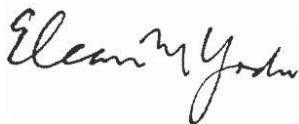
5.0 RECOMMENDATIONS

1. Remove the woody vegetation within the following locations:
 - i. Brush along the upstream toe of dam’s water edge
 - ii. Young trees along the western retaining wall of the principal spillway.

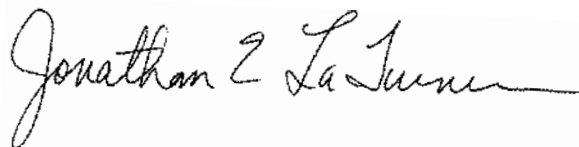
All undesirable vegetation growth within these areas should be removed by cutting or spraying as part of an annual maintenance program.
2. Dam should be monitored on a regular basis for the presence of any animal burrows on the embankment. Existing animal burrows as well as those found at any time should be filled with competent, well compacted material. If deemed necessary, a rodent control program should be implemented.
3. Downstream bank of dam should be monitored for seepage and further depressions. The bank should be monitored for any loss of vegetation and/or bare flow paths.

Sincerely,

DLZ INDIANA, LLC



Eleanor Yoder, E.I.
Civil Engineer I

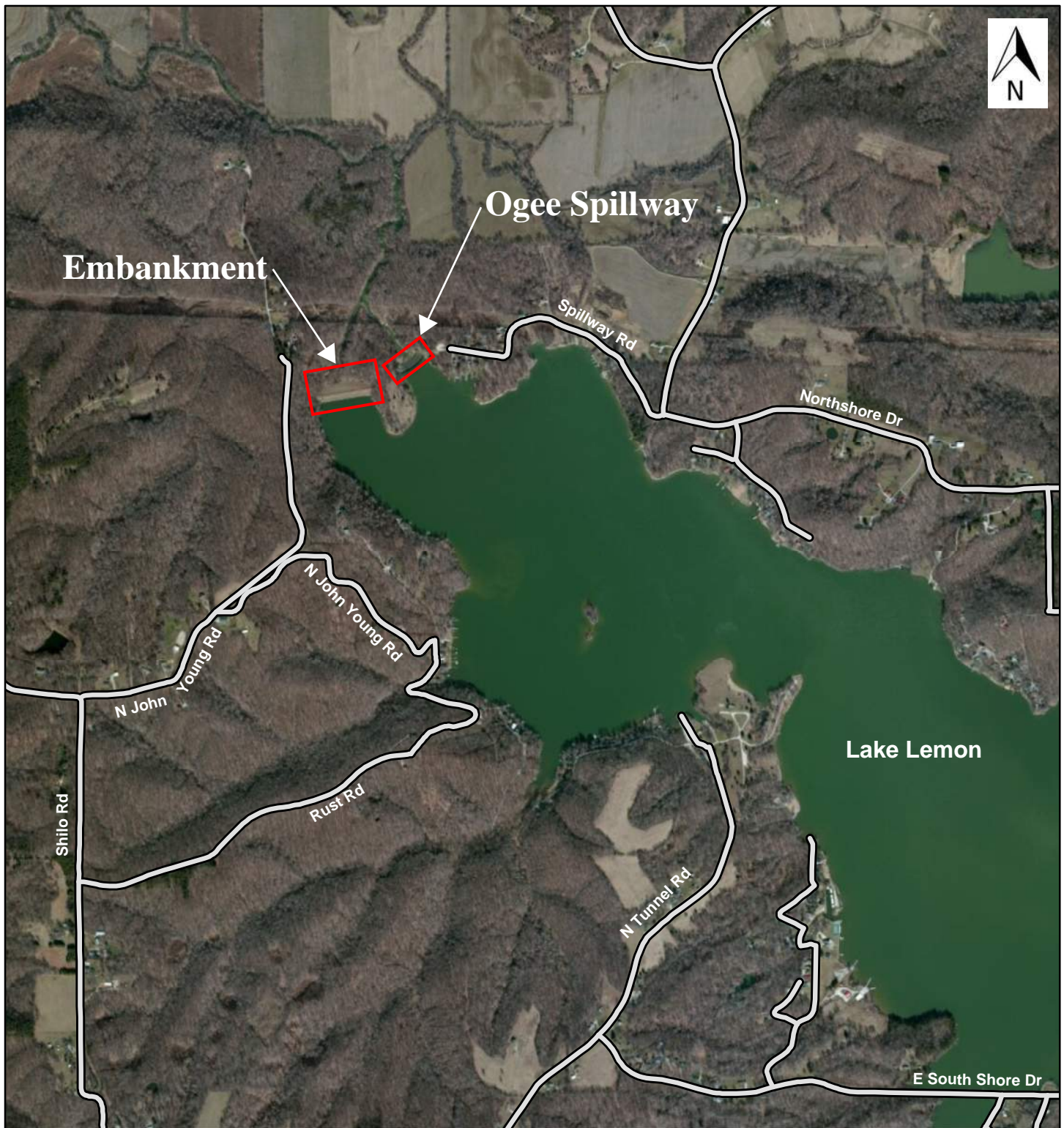


Jonathan E. LaTurner, P.E.
Division Manager

APPENDIX I

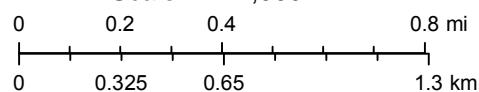
DAM EMBANKMENT AND SPILLWAY LOCATION

Lake Lemon Dam Embankment and Spillway Location



Date: March 8, 2021
Inspector: Jonathan E. LaTurner, P.E.

Scale: 1: 24,000



LEGEND:

— Minor Road

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

APPENDIX II

INSPECTION PHOTOGRAPHS

Lake Lemon Photograph Location Map



Date: March 8, 2021

Inspector: Jonathon E. LaTurner, P.E.
Eleanor M. Yoder, E.I.

INSPECTION PHOTOGRAPHS



Photograph No. 1

Looking south at gate upstream 42" auxiliary spillway outlet stilling basin



Photograph No. 2

Looking east - along west upstream water edge



**LAKE LEMON DAM
UNIONVILLE, INDIANA**

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 3

Looking east - crest of dam - minor rutting



Photograph No. 4

Looking down at west animal burrow



LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 5

Looking east - tire rutting at crest



Photograph No. 6

Looking down at east animal burrow



LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 7

Looking west - crest of dam



Photograph No. 8

Looking east along upstream water edge - brush/vegetation to be removed



LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 9

Looking west - along east upstream water edge



Photograph No. 10

Looking north from downstream slope of dam towards stilling basin



**LAKE LEMON DAM
UNIONVILLE, INDIANA**

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 11

Looking north at downstream 42" auxiliary spillway outlet stilling basin



Photograph No. 12

Looking west at downstream 42" principle spillway outlet stilling basin



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UNIONVILLE, INDIANA

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INSPECTION PHOTOGRAPHS



Photograph No. 13

Looking west at downstream 42" principle spillway outlet stilling basin - near shot at added riprap



Photograph No. 14

Looking west at downstream 42" principle spillway outlet stilling basin - wide shot at added riprap



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UNIONVILLE, INDIANA

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INSPECTION PHOTOGRAPHS



Photograph No. 15

Looking southeast at northern slope of dam - no seepage, slight flow path



Photograph No. 16

Looking south along west retaining wall



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UNIONVILLE, INDIANA**

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 17

Looking east at near shot of ogee spillway



Photograph No. 18

Looking northeast at wide shot of downstream ogee spillway



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UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 19

Looking east at wide shot of ogee spillway



Photograph No. 20

Minor woody vegetation/brush along west retaining wall to be removed



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UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 21

Minor woody vegetation/brush along west retaining wall to be removed



Photograph No. 22

Minor woody vegetation/brush along west retaining wall to be removed



LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 23

Looking west at wide shot of ogee spillway - including added riprap along east wall



Photograph No. 24

Looking down at minor displacement on west retaining wall of ogee spillway - wide shot



LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 25

Looking down at minor displacement on west retaining wall of ogee spillway - near shot



Photograph No. 26

Looking upstream of ogee spillway



LAKE LEMON DAM
UNIONVILLE, INDIANA

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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INSPECTION PHOTOGRAPHS



Photograph No. 27

Wide shot looking west/upstream of ogee spillway



**LAKE LEMON DAM
UNIONVILLE, INDIANA**

Date Photographs Taken: 3/08/21

Inspector: JEL and EMY

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APPENDIX III

COMPLETED IDNR DAM INSPECTION FORM & DAM SAFETY INSPECTION CHECKLIST

SUGGESTED DAM INSPECTION REPORT (Refer to pages 5 and 6 for instructions.)

[Print Form](#)

Name of Professional Conducting Inspection Jonathan E. LaTurner, P.E.	Professional License No. (Indiana) PE910028
Business Address 138 N Delaware St., Indianapolis, IN 46237	Phone: (day) 317 - 633 - 4120 (evening) _____

Company Name DLZ Indiana LLC
--

INSPECTION PREPARATION: Reviewed all pertinent technical documentation related to this dam and site in the State's and the Owner's files:
Yes ☒ No ☐ Comment _____

MULTIDISCIPLINARY: I am experienced in the technical disciplines or I am working with other professionals experienced in the technical disciplines to properly inspect this dam and appurtenant works. Technical disciplines, in addition to the general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical. Yes ☒ No ☐ Comment _____

Dam Name Lake Lemon Dam		Quad. Hindustan	Date of Inspection 03 / 08 / 2021	
State Dam ID 58-1	Permit (if unapproved see pg. 6) State Approved Construction Completed in 1952	County Monroe	Sec. T. R. 28 10 N 1 E	Last Inspection 02 / 27 / 2019
Owners Name City of Bloomington Utilities				Owner's Phone ()
Address/Zip Code P.O. Box 1216, Bloomington, IN 47401				
Contact's Name Adam Casey, Manager		Contact's Phone (day) 812 - 334 - 0233 (evening) 812 - 320 - 2841		Spillway Width Top Bot. ~330 ~16
Hazard High	Drainage Area ~71 MI²	Surface Area ~1700 AC	Height ~50 FT	Crest Length ~660 FT
			Crest Width ~13 FT	Inlet Below Crest ~16 FT
				Slope: Up 3 1/2: 1 Down 3 1/2: 1

FIELD CONDITIONS OBSERVED	DRAWDOWN STRUCTURE
Water Level - Below Dam Crest ~15.8 Ft.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> None
Ground Moisture Condition: Dry <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Snowcover <input type="checkbox"/> Other _____	Comment A 42-in. diameter R.C. pipe with a gateway and stilling basin.

MONITORING <input type="checkbox"/> Yes <input checked="" type="checkbox"/> None [<input type="checkbox"/> Gage Rod <input type="checkbox"/> Piezometers <input type="checkbox"/> Seepage Weirs <input type="checkbox"/> Survey Monuments <input type="checkbox"/> Other]
Comments _____

A UPSTREAM SLOPE	PROBLEMS NOTED: <input type="checkbox"/> (A-1) None <input type="checkbox"/> (A-2) Riprap - Missing, Sparse, Displaced, Weathered <input type="checkbox"/> (A-3) Wave Erosion-with Scarps <input type="checkbox"/> (A-4) Cracks-with Displacement <input type="checkbox"/> (A-5) Sinkhole <input type="checkbox"/> (A-6) Appears Too Steep <input type="checkbox"/> (A-7) Depressions or Bulges <input type="checkbox"/> (A-8) Slides <input checked="" type="checkbox"/> (A-9) Animal Burrows <input checked="" type="checkbox"/> (A-10) Trees, Brush, Briars <input type="checkbox"/> (A-11) Other _____
GOOD <input type="checkbox"/>	Comments:
ACCEPTABLE <input checked="" type="checkbox"/>	
DEFICIENT <input type="checkbox"/>	
POOR <input type="checkbox"/>	

Minor woody scrub brush present along the west end of upstream toe at the waters edge.

Two animal burrows found on upstream slope of dam, both measuring approximately 6" in diameter.

B CREST	PROBLEMS NOTED: <input type="checkbox"/> (B-1) None <input checked="" type="checkbox"/> (B-2) Ruts or Puddles <input type="checkbox"/> (B-3) Erosion <input type="checkbox"/> (B-4) Cracks with Displacement <input type="checkbox"/> (B-5) Sinkholes <input type="checkbox"/> (B-6) Not Wide Enough <input type="checkbox"/> (B-7) Low Area <input type="checkbox"/> (B-8) Misalignment <input type="checkbox"/> (B-9) Inadequate Surface Drainage <input type="checkbox"/> (B-10) Trees, Brush, Briars <input type="checkbox"/> (B-11) Other _____
GOOD <input checked="" type="checkbox"/>	Comments:
ACCEPTABLE <input type="checkbox"/>	
DEFICIENT <input type="checkbox"/>	
POOR <input type="checkbox"/>	

Slight rutting due to tire tracks.

Spillway Width refers to the open channel (typically the emergency or auxiliary spillway) at the control section.

Ft. FBD. refers to the vertical distance from the emergency (auxiliary) spillway control section to the lowest point of the crest of the dam.

Inlet Below Crest refers to the vertical distance from the inlet of the principal spillway to the crest of the dam.

C DOWNSTREAM SLOPE

GOOD	<input type="checkbox"/>
ACCEPTABLE	<input checked="" type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

PROBLEMS NOTED: ☒ (C-1) None ☐ (C-2) Livestock Damage ☐ (C-3) Erosion or Gullies ☐ (C-4) Cracks with Displacement ☐ (C-5) Sinkholes ☐ (C-6) Appears too Steep ☐ (C-7) Depression or Bulges ☐ (C-8) Slide ☐ (C-9) Soft Areas ☐ (C-10) Trees, Brush, Briars ☐ (C-11) Animal Burrows ☒ (C-12) Other _____

Comments:

Appears to be soft soils at surface only with no seepage apparent. A shallow flow path was identified along downstream slope leading to toe.

D SEEPAGE

GOOD (NONE)	<input checked="" type="checkbox"/>
ACCEPTABLE	<input type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

PROBLEMS NOTED: ☒ (D-1) None ☐ (D-2) Saturated Embankment Area ☐ (D-3) Seepage Exits on Embankment ☐ (D-4) Seepage Exits at Point Source ☐ (D-5) Seepage Area at Toe ☐ (D-6) Flow Adjacent to Outlet ☐ (D-7) Seepage Clear/Muddy

[DRAIN OUTFALLS SEEN] ☒ No ☐ Yes ☐ (D-8) Flow Clear/Muddy ☐ (D-9) Dry/Obstructed]

☐ (D-10) Other _____ Describe location of drains and indicate amount and quality of discharge.

Comments:

No apparent seepage observed.

E PRINCIPAL SPILLWAY

GOOD	<input type="checkbox"/>
ACCEPTABLE	<input checked="" type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

DESCRIPTION: A 329-foot long concrete ogee-type (curved crest) structure located in a valley northeast of the dam.

PROBLEMS NOTED: ☐ (E-1) None ☐ (E-2) Deterioration ☐ (E-3) Separation ☒ (E-4) Cracking ☐ (E-5) Inlet, Outlet Deficiency ☐ (E-6) Stilling Basin Inadequacies ☐ (E-7) Trash Rack ☐ (E-8) Other _____

Comments:

The concrete ogee section and retaining walls appeared unchanged since the 2019 inspection. The spillway appeared to be in satisfactory condition. Multiple areas of brush/young trees encroaching on western retaining wall. Minor concrete panel displacement on eastern retaining wall. Riprap has been added on eastern bank along retaining to improve erosion since the 2019 inspection.

F AUXILIARY SPILLWAY

GOOD	<input type="checkbox"/>
ACCEPTABLE	<input checked="" type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

DESCRIPTION: Stilling basin with drawdown sluiceway.

PROBLEMS NOTED: ☒ (F-1) None ☐ (F-2) No Auxiliary Spillway Found ☐ (F-3) Erosion-with Backcutting ☐ (F-4) Crack with Displacement ☐ (F-5) Appears to be Structurally Inadequate ☐ (F-6) Appears too Small ☐ (F-7) Inadequate Freeboard ☐ (F-8) Flow Obstructed ☐ (F-9) Concrete Deteriorated/Undermined ☐ (F-10) Other _____

Comments:

Riprap has been added at downstream side of the stilling basin of the drawdown sluiceway since 2019 inspection. Overall good condition.

G MAINTENANCE AND REPAIRS

GOOD	<input checked="" type="checkbox"/>
ACCEPTABLE	<input type="checkbox"/>
DEFICIENT	<input type="checkbox"/>
POOR	<input type="checkbox"/>

PROBLEMS NOTED: ☐ (G-1) None ☐ (G-2) Access Road Needs Maintenance ☐ (G-3) Cattle Damage ☐ (G-4) Spillway Obstruction ☐ (G-5) Brush, Weeds, Tall Grass, on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-6) Trees on Upstream Slope, Crest, Downstream Slope ☐ (G-7) Rodent Activity on Upstream Slope, Crest, Downstream Slope, Toe ☐ (G-8) Deteriorated Concrete-Facing, Outlet, Spillway ☐ (G-9) Gate and/or Drawdown Need Repair ☐ (G-10) Other _____

Comments:

Refer to page 3 of 6.

H OVERALL CONDITIONS

Based on this inspection and recent file review, the overall surficial condition is determined to be: ☒ (H-1) Satisfactory ☐ (H-2) Fair ☐ (H-3) Conditionally Poor ☐ (H-4) Poor ☐ (H-5) Unsatisfactory

IMPORTANT: IF THIS RATING IS DIFFERENT THAN PREVIOUS IDNR RATING, PLEASE ATTACH EXPLANATION AND REASONS FOR CHANGE ON PAGE 4.

**RECOMMENDATIONS AND ITEMS REQUIRING ACTION BY OWNER
TO IMPROVE THE SAFETY OF THE DAM**

MAINTENANCE-MINOR REPAIR-MONITORING

- ☐ (1) Provide Additional Erosion Protection: _____
- ☐ (2) Mow: _____ ☐ Remove vegetation and brush present along the west end of upstream toe at the dam's waters edge and along _____
- ☒ (3) Clear Trees and/or Brush From: ☒ on the west abutment of the ogee spillway.
- ☒ (4) Initiate Rodent Control Program and Properly Backfill Existing Holes: ☐ Properly backfill existing animal burrows on upstream bank of dam as well as monitor for any additional holes.
- ☐ (5) Repair: _____
- ☐ (6) Provide Surface Drainage For: _____
- ☒ (7) Monitor: Monitor downstream slope to prevent any flow path channels from forming and eroding bank.
- ☒ (8) Other: Monitor animal activities on the embankment, crest tire rutting and any movement of the spillway.
- ☐ (9) Other: _____

ENGINEERING-EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO:

(Plans & Specifications must be approved by State prior to construction.)

- ☐ (10) Prepare Plans and Specifications for the Rehabilitation of the Dam: _____
- ☐ (11) Prepare As-Built Drawings of: _____
- ☐ (12) Perform a Geotechnical Investigation to Evaluate the Stability of the Dam: _____
- ☐ (13) Perform a Hydrologic Study to Determine Required Spillway Size: _____
- ☐ (14) Prepare Plans and Specifications for an Adequate Spillway: _____
- ☐ (15) Set up a Monitoring Program: _____
- ☐ (16) Refer to Unapproved Status of Dam: _____
- ☐ (17) Develop an Emergency Action Plan: _____
- ☐ (18) Other: _____
- ☐ (19) Other: _____

Recommended schedule for upgrades/comments (Please prioritize and note importance of each item.)

Photographs ☐ Attachments ☐

ENGINEER'S INSTRUCTION Instructed owner on the safety concerns with the structure and how to monitor and inspect the dam and appurtenant works in the interim period between the regulatory two-year inspections. Yes ☒ No ☐

Comment

It is recommended the Lake Manager and Lake Staff continue to visually monitor possible seepage on a regular basis and after significant rainfall events. Contact a qualified engineering firm if any changes are noted.

Professional Engineer's Signature _____ Date _____

Reviewed By _____ Date _____
Owner/Owner's Representative

EXPLANATION FOR CHANGE IN RATINGS (Describe all repairs, upgrades or improvements made if dam conditions and rating have improved since the last inspection. Describe deteriorating conditions if ratings have worsened.)

REASONS FOR RATING CHANGE:

PREVIOUS RECOMMENDATIONS FOR MAINTENANCE, REPAIRS, AND UPGRADES:

HAVE THEY BEEN PERFORMED ☒ YES ☐ NO (If no, please explain:)

* As requested in the 2019 report, riprap has been added along the bank of the eastern abutment of the principal spillway as well as along the downstream end of the sluiceway.

Supporting Documentation

Photographs ☒ Attachments ☐ Calculations ☐ Drawings ☐ Other ☐

Comments:

INSTRUCTIONS FOR COMPLETING DAM VISUAL INSPECTION REPORT

1. Complete all items that are applicable; if not applicable, write in "N/A". For concrete dams, complete all applicable items and use "comments" section to cover items not included in the check boxes. Also indicate that the dam is concrete in the comments section.
2. Use page 6 to determine ratings of each dam component (items A through G) and for Overall Conditions (Item H).
3. Please write legibly and concisely.
4. Inspector must be knowledgeable with the type of dam, materials, and components being inspected. If not, qualified assistance shall be engaged.
5. The inspector shall review the dam owner's and IDNR project files prior to the inspection. Previous inspection reports shall be closely reviewed for previous problems and deficiencies.
6. If the ratings of the components (items A through G) or the Overall Conditions (item H) of the dam have changed since the last inspection, please complete page 4. If a rating has improved, dam repairs, improvements, analyses, or maintenance must have been performed and documented on page 4.
7. For a dam to have a satisfactory "Overall Conditions" rating, it must have no existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including infrequent hydrologic events (PMP for high hazard dams) and seismic events. The dam owner's project files must contain hydrologic and hydraulic analyses of the dam and its spillways to verify performance. The files must also contain slope stability analyses to verify embankment stability under full reservoir conditions and rapid-draw down conditions. The dam and all of its components must meet current IDNR and design standards. "Normal" deficiencies such as minor erosion, minor seepage, or normal concrete aging may not make a dam unsatisfactory or unacceptable. For a satisfactory "Overall Conditions" rating to be assigned, items A through G generally should all have a "good" rating; however, in some cases an "acceptable" rating may be satisfactory if the "Problems Noted" are minor, or "normal" conditions, such as minor erosion rills, small puddles on crest, or if grass needs mowed, but is in good condition.
8. An inspection report form must be submitted to IDNR along with a formal technical inspection report as described in Chapter 4.0 of Part 3 of the Indiana Dam Safety Inspection Manual.
9. Please sign and date this page in the space below to verify that you have read and understand these instructions.

Inspector's Signature: 

Date: 3/30/2021

GUIDELINES FOR DETERMINING CONDITIONS

CONDITIONS OBSERVED - APPLIES TO UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, PRINCIPAL SPILLWAY, AUXILIARY SPILLWAY

GOOD	ACCEPTABLE	DEFICIENT	POOR
In general, this part of the structure has a good appearance, and conditions observed in this area do not appear to threaten the safety of the dam.	Although general cross-section is maintained, surfaces may be irregular, eroded, rutted, spalled, or otherwise not in new condition. Conditions in this area do not currently appear to threaten the safety of the dam.	Continued deterioration and/or unusual loading may threaten the safety of the dam.	Conditions observed in this area appear to threaten the safety of the dam. Conditions observed in this area are unacceptable.

CONDITIONS OBSERVED - APPLIES TO SEEPAGE

GOOD (NONE)	ACCEPTABLE	DEFICIENT	POOR
No evidence of uncontrolled seepage. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions do not appear to threaten the safety of the dam.	Some seepage exists at areas other than the drain outfalls, or other designed drains. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions observed do not currently appear to threaten the safety of the dam.	Excessive seepage exists at areas other than drain outfalls and other designed drains. Seepage needs to be evaluated. Increased flow and/or continued deterioration in seepage conditions may threaten the safety of the dam.	Excessive seepage conditions observed appear to threaten the safety of the dam and is unacceptable. Examples: 1) Designed drain or seepage flows have increased without increase in reservoir level. 2) Drain or seepage flows contain sediment. i.e., muddy water or particles in jar samples. 3) Widespread seepage, concentrated seepage or ponding appears to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO MAINTENANCE AND REPAIR

GOOD	ACCEPTABLE	DEFICIENT	POOR
Dam appears to receive effective on-going maintenance and repair, and only a few minor items may need to be addressed.	Dam appears to receive maintenance, but some maintenance items need to be addressed. No major repairs are required.	Level of maintenance of the dam needs significant improvement. Major repairs may be required. Continued neglect of maintenance may threaten the safety of the dam.	Dam does not receive adequate maintenance. One or more items needing maintenance or repair has begun to threaten the safety of the dam. Level of maintenance is unacceptable.

OVERALL CONDITIONS

SATISFACTORY - No existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including such events as infrequent hydrologic and/or seismic events. Project Files contain necessary hydrologic, and other engineering calculations to verify dam safety and performance.

FAIR - No existing dam safety deficiencies are recognized for normal loading conditions. Infrequent hydrologic and/or

seismic events would probably result in a dam safety deficiency.

CONDITIONALLY POOR - A potential safety deficiency is recognized for unusual loading conditions which may realistically occur during the expected life of the structure. **CONDITIONALLY 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.

POOR - A potential dam safety deficiency is clearly recognized for normal loading conditions. Immediate actions to resolve the deficiency are recommended; reservoir restrictions may be necessary until problem resolution.

UNSATISFACTORY - A dam safety deficiency exists for normal conditions. Immediate remedial action is required for problem resolution.

HAZARD CLASSIFICATIONS OF DAMS (STRUCTURE)

LOW HAZARD- A structure the failure of which may damage farm buildings, agricultural land, or local roads

SIGNIFICANT HAZARD- A structure the failure of which may damage isolated homes and highways, or cause the temporary interruption of public utility services.

HIGH HAZARD- A structure the failure of which may cause the loss of life and serious damage to homes, industrial and commercial buildings, public utilities, major highways, or railroads.

UNAPPROVED STATUS OF DAM

A dam that has been given an unapproved status (see entry for permit) means that plans, construction specifications, hydraulic analyses, and/or a geotechnical investigation on your dam, proving the safety of the structure, have not been received and approved by the Indiana Department of Natural Resources (IDNR). IDNR records indicate that no progress has been made to secure this approval. The fact that the dam is inspected under the Regulation of Dams Act (IC 14-27-7.5) in no way alters the illegal status of the structures.

If your dam is indicated to be unapproved, it is requested that your engineer contact the Indiana Department of Natural Resources,

APPENDIX IV

LAKE LEMON 42" OUTFALL PIPE INSPECTION REPORT (L&M LAB TECH)



1816 Nash Dr.
St. Joseph, Michigan 49085

March 24th 2021

Sluice Gate and Sluice Gate Well Inspection; 42" conduit and intake grate inspection

Lake Lemon Conservancy District
7599 North Tunnel Road
Unionville, Indiana 47468
Attention: Adam Casey
Phone (812) 334-0233
Email: Manager@lakelemon.org

Subject: Lake Lemon 42" outfall Inspection

Inspection Date February 22nd, 2021

L an M #554-2021

Dear Mr. Casey,

L and M Fabrication is pleased to provide you with this report for the inspection performed on the outfall pipes on Lake Lemon. Attached, please find the inspection report and pictures illustrating the findings identified during the inspection.

In conclusion: The 42-inch pipe is in good condition and bar racks are also in good condition with no major buildup of material in either.

The outfall basin overall is in good condition. Thank you, and if you should have any further questions please contact me or Michael Trapp at 269-369-7409 or through the listings provided below:
captmt@me.com

LAKE LEMON CONSERVANCY
DISTRICT

Dive Supervisor: Chris Grinstead
Inspection Diver: Tim Saylor

Inspected On February 22, 2021

Submitted by:
L and M Fabrication
1816 Nash Drive
St. Joseph, Michigan 49085
Phone: (269) 369-7409

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1.0 PURPOSE

1.1 Inspection of 42" outfall pipe

1.1.1 Inspection of Plant River Water Intake Pipes:

- a) Upstream
- b) Downstream
- c) Sluice Gate
- d) Basin

2.0 SITE CONDITIONS

Weather: 64 F / Sunny

River Conditions: Flat with no waves, wind 5mph out of the southwest

Elevation: <1000'

Water Visibility: 6" or less

Water Depth: 27'

Current: Minimal

Water Temperature: 42° F

Flow Conditions at Pipe: None

Access: Through an opening of the earth dam with ladder access

3.0 CREW AND EQUIPMENT

Crew: Standard Inspection / Four Man Dive Crew

One (1) Diving Supervisor: Chris Grinstead

One (1) Inspection Diver: Tim Saylor

One (1) In Water Tender: Skyler Daisy

One (1) Stand-By Diver: Benito Juarez

One (1) Tenders: Skyler Daisy

Equipment: Two (2) 1 Ton Crew Cab Truck, 24' Pen Trailer with a 370 air compressor, video capability.

FINDINGS

Upstream of Sluice Gate Findings:

Starting from the upstream side heading out to the lake the ladder is anchored properly and in good condition. In the pipe traveling upstream towards the lake, sediment in the pipe and on the walls was no greater than 1 inch of light sand on the bottom and very light coverage of algae on the walls. This is consistent for the first 60 feet, at which point the diver located the first construction joint. The joints are in 10-foot increments that stayed consistent for the remaining length of the pipe. The debris built up to 6 inch by the time 70 feet was reached. By the time 100 feet was reached, small shells were present at the bottom of the pipe along with some sand/mud type material. The diver made it to the bar racks at 180 feet into the pipe. The racks were in good condition with slight wear uniformly on all of the bars. The racks are 80 percent covered with small sticks and algae, which was easily brushed away by hand. This section of pipe did not show any signs of cracking or any damage.

The water depths for this dive at the entrance was 26 feet and maintained that depth until the diver made it to the bar rack, at which time the depth was 27 feet.

Downstream of the Sluice Gate Findings

The diver entered the 42-inch pipe from the basin and traveled up to the sluice gate. Depth of water in the pipe stayed consistent at 5 feet. The sediment in the pipe was a uniform with less than one inch of sand. This pipe also had construction joints every ten feet. By the time the diver reached 170 feet, the debris went away and the diver began to lose visibility. With poor visibility, the diver did not find any major damage to pipe itself. The distance the diver traveled to the sluice gate from the entry point was 180 feet.

Sluice Gate:

The sluice gate was inspected from both upstream and downstream sides and it was found to be in great condition- all hardware was in place and tight. The diver followed it up to the surface and all cross bracing hardware are solid, as well as the stem. The water depth for this dive was 26 feet on the upstream side and 5 feet on the downstream side.

Basin:

The basin overall was being in good condition. With no change since last inspection/repair work.

Recommendations:

Annual inspection of debris inside pipe and sediment removal if conditions worsen over time.

Photos:

Upstream Entry Point



Down Stream Entry Point



L and M Fabrication



L and M Fabrication



Sincerely,
Michael Trapp
L and M Fabrication Dive Supervisor
(269)369-7409
captmt@me.com