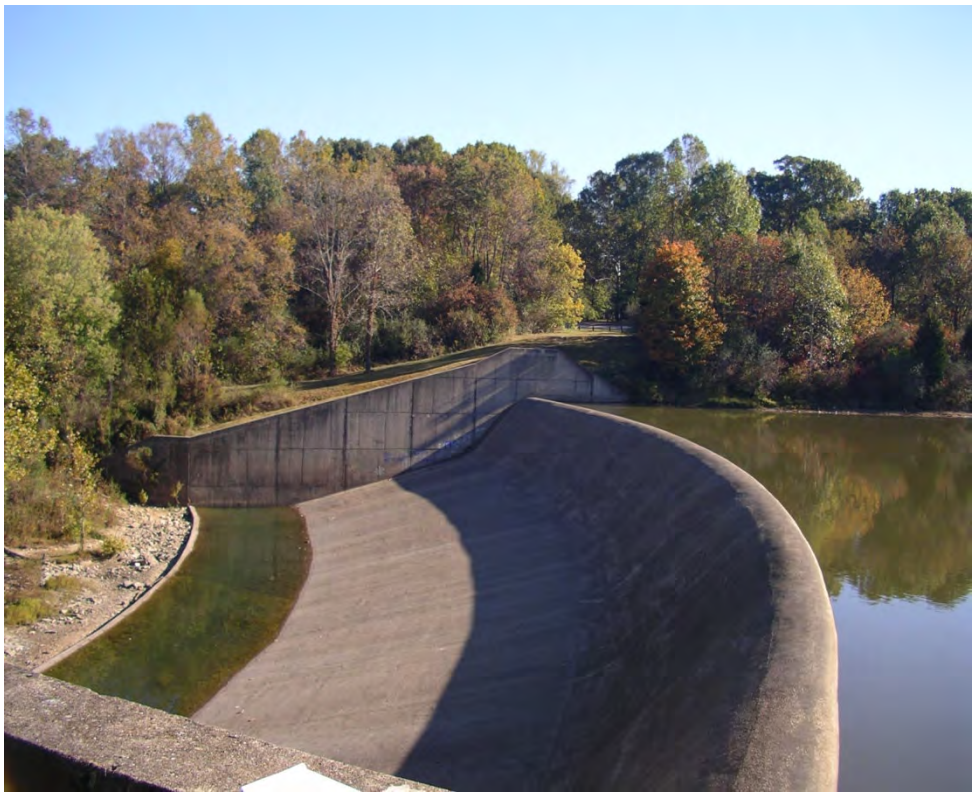

Report for:

2010 Inspection Report
Lake Lemon Dam
Unionville, Indiana

Prepared for:

Lake Lemon Conservancy District
7599 North Tunnel Road
Unionville, Indiana 47468

DLZ Ohio, Inc.

6121 Huntley Road
Columbus, Ohio 43229-1003
Phone: (614) 888-0040
Fax: (614) 888-6415

DLZ Job No. 1063-0717.90

December, 2010

Prepared by:

DLZ

INSPECTION REPORT

LAKE LEMON DAM

Unionville, Indiana

Prepared by:

DLZ OHIO, INC.
6121 Huntley Rd
Columbus, Ohio 43229

December 2010

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APPENDICES

2010 INSPECTION REPORT
LAKE LEMON DAM
UNIONVILLE, INDIANA

INTRODUCTION

As requested by the Lake Lemon Conservancy District and the City of Bloomington Utilities, DLZ performed a field inspection of Lake Lemon Dam on October 5, 2010. Mr. Eric Tse, a geotechnical engineer with DLZ, completed the surficial inspection. During the inspection, color photographs were taken of pertinent features of the dam. Representative photographs are included in this report in Appendix I.

A representative of Commercial Diving Services (CDS) inspected the interior of the outlet works, including the sluice gate, the gatewell, and the intake conduit. A copy of their inspection report is presented in Appendix II.

This report presents the observations and recommendations resulting from the 2010 inspection. As part of the inspection, the Indiana Department of Natural Resources (IDNR's) files as well as previous inspection reports for the project were reviewed. The completed IDNR Dam Inspection Report Form is presented in Appendix III.

PROJECT INFORMATION

General

Lake Lemon dam was originally constructed in the early 1950's. For years the project was used for water supply to the City of Bloomington, but is now used for recreation. The drainage area is approximately 71 square miles and the pool area is approximately 1,700 acres. The earth 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 approximately 1V:3.5H.

The outlet works consist of a reinforced concrete pipe near the left abutment. From its inlet to the gatewell, the pipe is 42 inches in diameter while the portion of the pipe between the gatewell and the stilling basin is 30 inches in diameter. Flow through the pipe is controlled by a sluice gate, and the pipe discharges into a stilling basin.

The principal spillway is a 329-foot long, concrete ogee-type structure. The spillway is located in a valley northeast of the embankment.

It is understood from the lake manager that when the pool rises to the spillway crest the majority of the water tends to spill over the southwest end of the spillway. It is suspected that the southwest end of the spillway may have settled slightly (about 3 inches) over the years.

It should be noted that no significant precipitation events had occurred in the project area for almost two weeks before this inspection. As a result, the pool level was approximately 2 feet below the top of the principal spillway at the time of this inspection.

Recent Repairs

In the 2008 Inspection Report, recommendations were made for additional monitoring and maintenance. It is understood that Tasks #2, 3 and 4, as recommended in the 2008 inspection report, were completed in September 2009. Detailed of these tasks are as follows.

Task #2: Ruts in the crest were filled with dirt, leveled and seeded.
Task #3: New vegetation around the stilling basin was removed.
Task #4: Rocks was placed in the scoured area immediately downstream of the stilling basin.

Security

Access to the embankment is along a private drive with a locked gate. The lake manager has access to this lock, as well as the City of Bloomington Utilities.

FIELD INSPECTION

Embankment

The inspection disclosed no serious problem areas in the physical condition of the embankment. The slopes were relatively uniform; no significant bulges or depressions were noted. Grass and vegetation on the embankment slopes and crest was low and had been mowed recently (Photos 1, 2 and 3). It is understood from the lake manager that the embankment is typically mowed twice a year: once in the spring and once in the fall.

Isolated small trees were observed along the shore of the upstream embankment slope (Photo 4). These small trees should be removed. Rutting on the crest was noted in the 2008 inspection. The rutting occurred as a result of a large rainfall event in June 2008 and subsequent vehicular mower traffic. The ruts were filled after the 2008 inspection. Rutting was not observed during this inspection. An animal burrow was observed on the right side of the upstream slope, near the shore (Photo 5). Since animal passageways can lead to water piping in the embankment soils, it is recommended that the embankment be monitored visually on a regular basis. Any burrows should be filled with competent, well compacted material. If deemed necessary, a rodent control program may be needed to prevent the propagation of the burrowing animal population and to prevent future damage to the dam.

In previous inspections, an area of possible seepage was observed along the downstream toe, near the midpoint of the embankment. This area appears to be the location of the original stream channel. No discharge was seen during the 2008 inspection, but the old channel was wet with iron-stained, brackish water. However, during this inspection the old channel was dry (Photo 6) and no seepage was noted along the downstream toe (Photo 7). Because of the high hazard

associated with the project, it is recommended that this area be monitored on a monthly basis and following significant rainfall events. Any appearance of seepage and subsequent changes in seepage quantity in this area should be brought to the attention of a dam engineer immediately.

Ponded water was observed immediately downstream of the right groin in previous inspections. Runoff from the embankment and right abutment tends to pond in this area. In past inspections, it was suggested that the owner consider regrading this area to allow for proper water drainage. It is understood that the owner did review this area in 2007 and the area was dry at that time. Consequently, the owner did not feel re-grading was necessary. During this inspection, standing water was not observed immediately downstream of the right groin (Photo 8). However, it is recommended that the area be monitored particularly after periods of heavy rain.

Outlet Works

Internal Inspection

As part of the 2010 inspection, the gatewell (Photo 9) and the upstream portion of the outlet works were inspected. A diver from CDS Construction performed the inspection (Photo 10). It should be noted that CDS divers inspect and operate the Lake Lemon sluice gate every two years and are very familiar with the project. A copy of their inspection report is presented in Appendix III. Please refer to the inspection report for additional information pertaining to the CDS inspection.

During the 2006 inspection of the downstream portion of the outlet pipe, a visible deficiency was noted. Approximately three feet downstream of the gate, filler was lost from a small section of the pipe joint. During the 2008 inspection, the diver repaired the joint with hydraulic cement. The diver indicated that the joint repair went well and no additional problems were reported. During the 2008 inspection, the diver also noted that the gate leaked slightly on the right side when in the closed condition.

During this inspection, the upstream portion of the outlet works, between the gatewell and the pipe inlet, was inspected. No obvious distress was noted in the concrete walls and floors during the inspection. However, the steel bars of the trash rack that keeps logs and debris from entering the gatewell have rusted almost half way through and should be replaced or repaired.

The gate stem was also observed. All of the frame bolts and adjusting bolts were checked for tightness. No distress was noted.

The sluice gate was raised approximately 4 inches to remove sediment at the bottom of the gate. The gate operated well and no problems were noted. No leakage through the gate was reported when in the closed position. It is recommended that the gate be exercised to its full limit at least once per year.

The CDS inspection report indicates that the ladder at the gatewell was in poor condition. It is recommended that the ladder be replaced or repaired.

External Inspection

The visible portions of the outlet works appeared in satisfactory condition. The condition of the stilling basin appeared unchanged from previous inspections (Photo 11 and Photo 12).

In previous inspections, a large crack was observed in the left wall near the end of the stilling basin. This crack appeared to be about ½ inch wide and extended from the top of the wall to the bottom (Photo 13). This crack appeared old and appeared unchanged from the 2008 inspection.

During the 2008 inspection, the stilling basin was dewatered as part of the inspection. An area of scour beneath the channel bottom was noted immediately downstream of the end of the stilling basin concrete pad. This scoured area was repaired by placement of riprap in the fall of 2009. However, it is understood that the rip rap was washed away during winter drawdown in the same year. The scoured area has not yet been backfilled with riprap (Photo 14). It is recommended that the scoured area be backfilled again with large riprap to prevent the scoured area from enlarging and undermining the stilling basin concrete slab. The stilling basin design should be reviewed to determine the water flow velocities at the end of the stilling basin so that the riprap can be properly sized for the anticipated velocities.

The banks of the outlet channel downstream of the stilling basin were showing signs of erosion and instability (Photo 15). This condition should be monitored. If debris in the channel affects the outflow, the debris should be removed.

Principal Spillway

The principal spillway was in acceptable condition (Photos 16, 17, 18, and 19). There appeared to be no significant changes since the last inspection. There had been some horizontal displacements, approximately ½ to ¾ inches, in the joints of the training walls over the years (Photo 20). However, during this inspection, a joint in the upper end of the right training wall was found to have widened to slightly over an inch (Photo 21). This joint widening is probably the result of water penetration and repeated freeze-thaw attacks over time. It is recommended that all joints be properly sealed with competent material.

A small tree and what appeared to be “mud dauber’s nests” were observed on the lower end of the right training wall (Photo 22). The tree and the nests should be removed and the concrete surface repaired, if necessary.

Large masses of brown “sticky” gelatinous substance were observed at the outlet pipes near the midpoint of the spillway’s end sill (Photo 23). This brown substance appeared to be iron bacteria, which could plug the outlet pipes if they grow excessively. The brown substance should be removed and cleared out of the pipes.

There was possible minor erosion immediately downstream of the end sill (Photo 24). If this condition worsens, the end slab could be endangered as the erosion progresses upstream beneath the slab. This erosion condition should be monitored, especially after significant spillway

discharges. If the condition worsens, it is anticipated that properly-sized riprap could be placed immediately downstream of the end sill to armor the area.

CONCLUSIONS

Based on our observations, it appears that the project condition has not changed significantly since the 2008 inspection, where the overall surficial condition of the project was determined to be 'Satisfactory'.

RECOMMENDATIONS

1. Remove isolated small trees along the shore.

2. Fill any animal borrows on the embankment with competent, well compacted material. Monitor animal activities on the embankment.

3. Monitor the area downstream of the right abutment groin for standing water following high pool events and after periods of heavy rain.

4. Monitor the area along the downstream toe near the midpoint of the embankment for possible seepage. Report any changes to a dam engineer immediately.

5. Repair scoured areas in the channel bottom immediately downstream of the end of the stilling basin concrete slab. It is anticipated that large riprap will be needed. The design velocities for the outflow will need to be evaluated to properly size the riprap.

6. Monitor the stability and erosion condition of the banks of the outlet channel downstream of the stilling basin concrete slab. Clear excessive debris in the outlet channel regularly.

7. Inspect the interior of the outlet pipe beneath the embankment again within four years. However, a more frequent inspection may be needed if conditions warrant.

8. Replace or repair the ladder at the gatewell.

9. Replace or repair the trash rack at the intake conduit.

10. Remove the small tree and what appeared to be “mud dauber’s nests” on the lower end of the right training of the principal spillway. Repair the concrete surface, if necessary.

11. Seal all joints and cracks in the training walls of the principal spillway. Visually monitor for any additional settlement or displacement of the principle spillway.

12. Remove and clear what appeared to be iron bacteria from the outlet pipes at the downstream toe of the spillway.

13. Following high pool events, monitor any channel erosion downstream of the ogee's end concrete sill.

14. A recent file review indicates that an emergency action plan (EAP) has not yet been prepared as recommended in the 2008 inspection report. It is recommended that an EAP be prepared as soon as possible.

CLOSING REMARKS

We appreciate having the opportunity to be of service to you on this inspection. If you have any questions, please do not hesitate to call.

Sincerely,

DLZ OHIO, INC.

Eric W. Tse, P.E.
Senior Geotechnical Engineer

Timothy A. Hampshire, P.E.
Geotechnical Engineering Division Manager

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APPENDIX I

Photographs

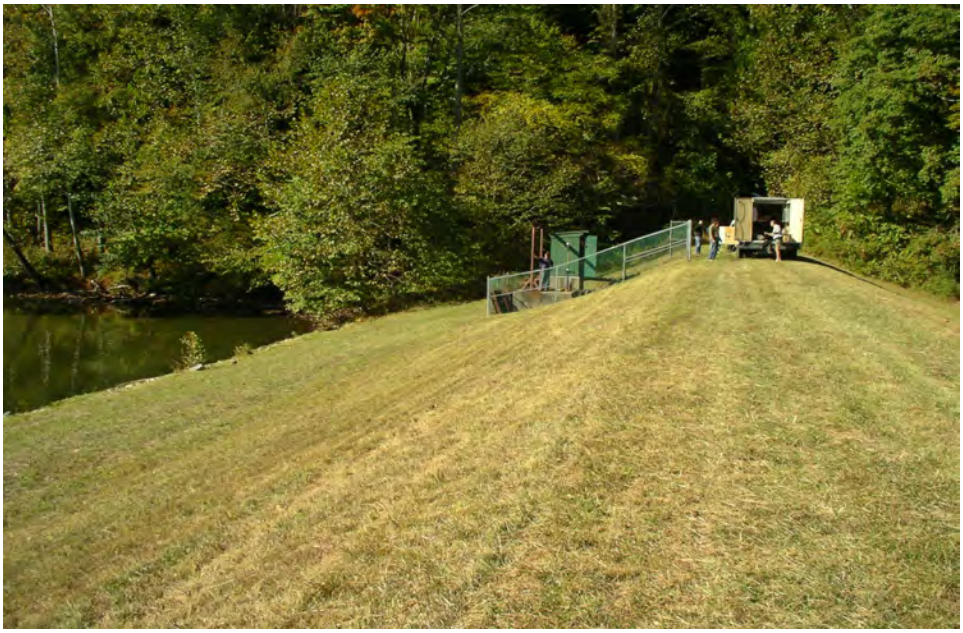


Photo 1. Embankment crest; view is towards left abutment.

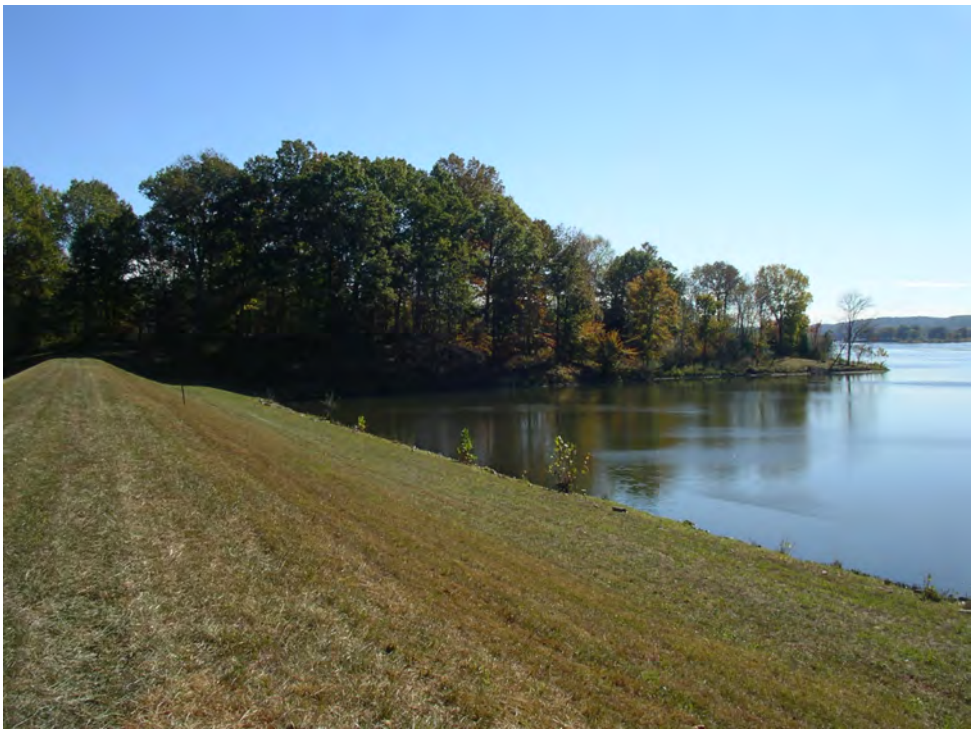


Photo 2. Upstream embankment slope; view is towards right abutment.

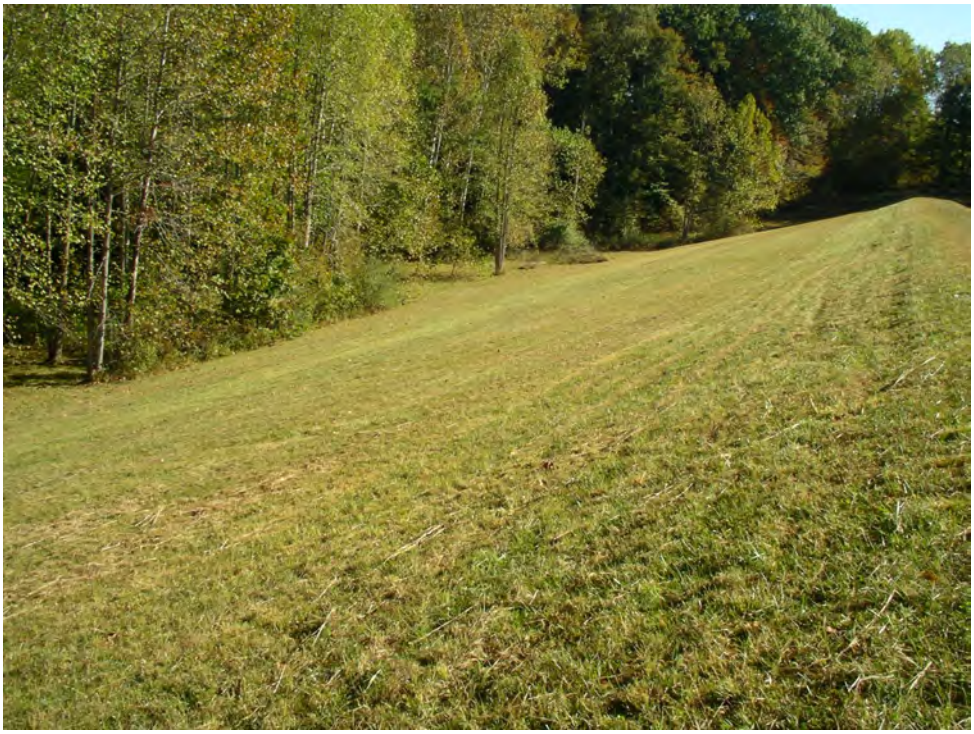


Photo 3. Downstream embankment slope; view is towards right abutment.

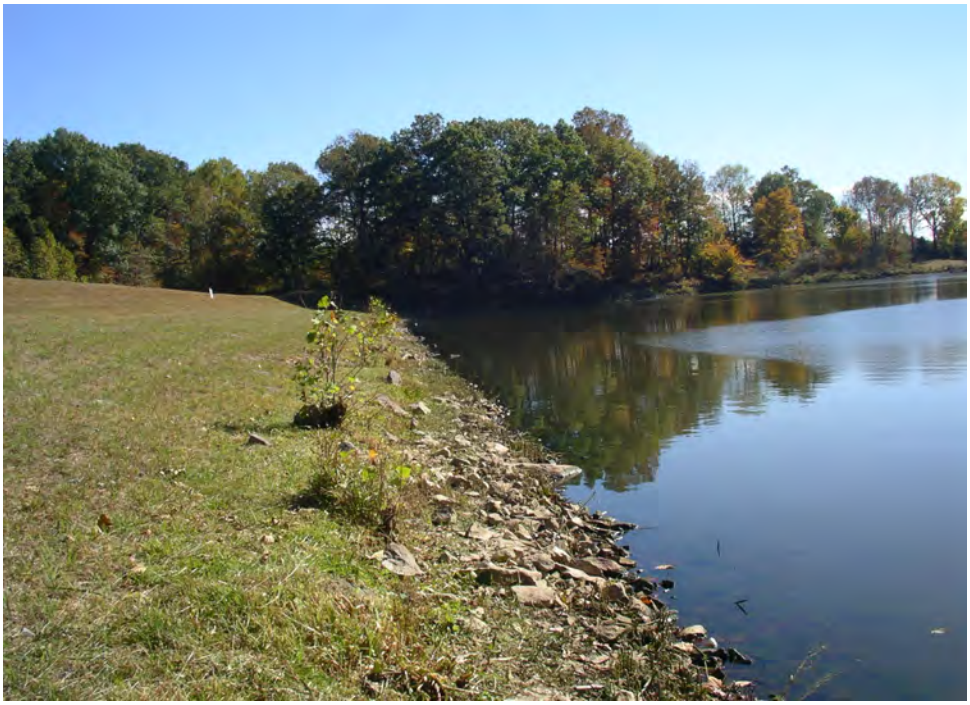


Photo 4. Isolated small trees along the shore.

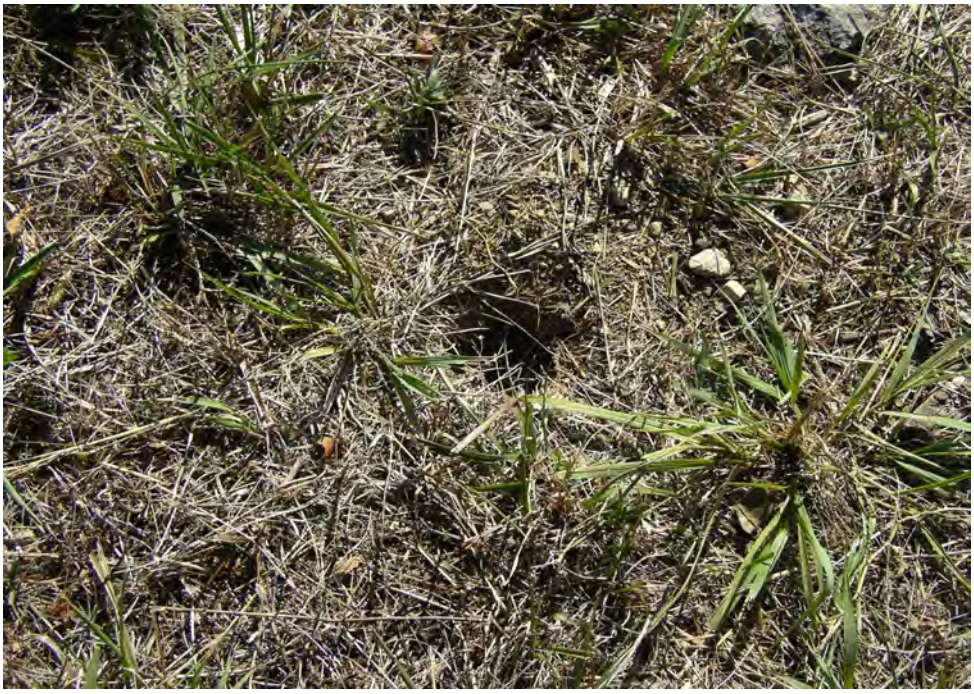


Photo 5. A burrow was observed on right side of upstream slope, near the shore.

Photo 6. Original stream channel downstream from midpoint of embankment.

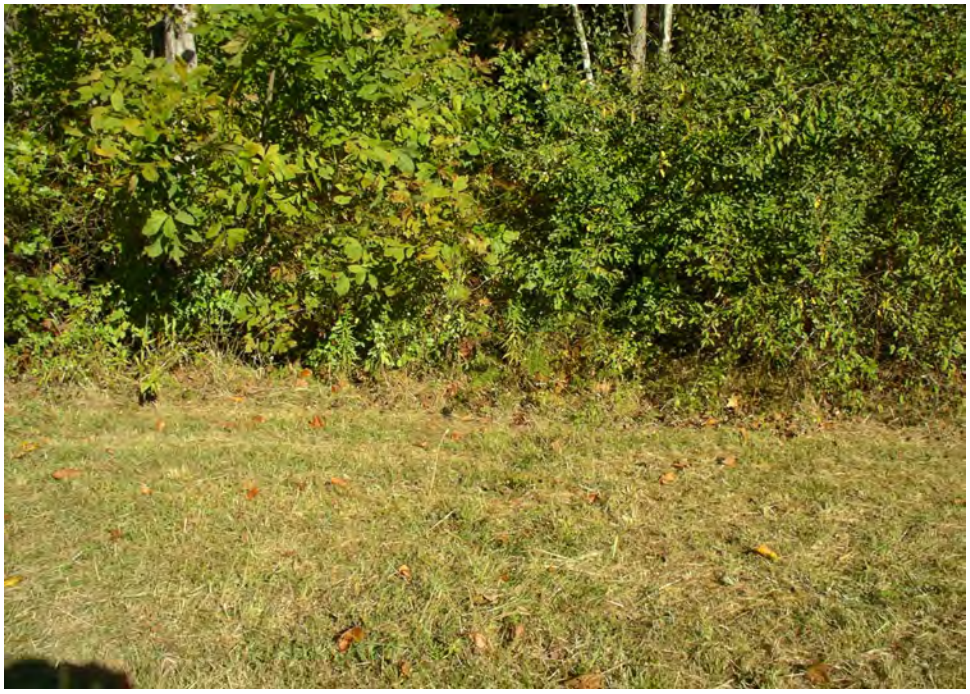


Photo 7. Downstream toe near midpoint of embankment.

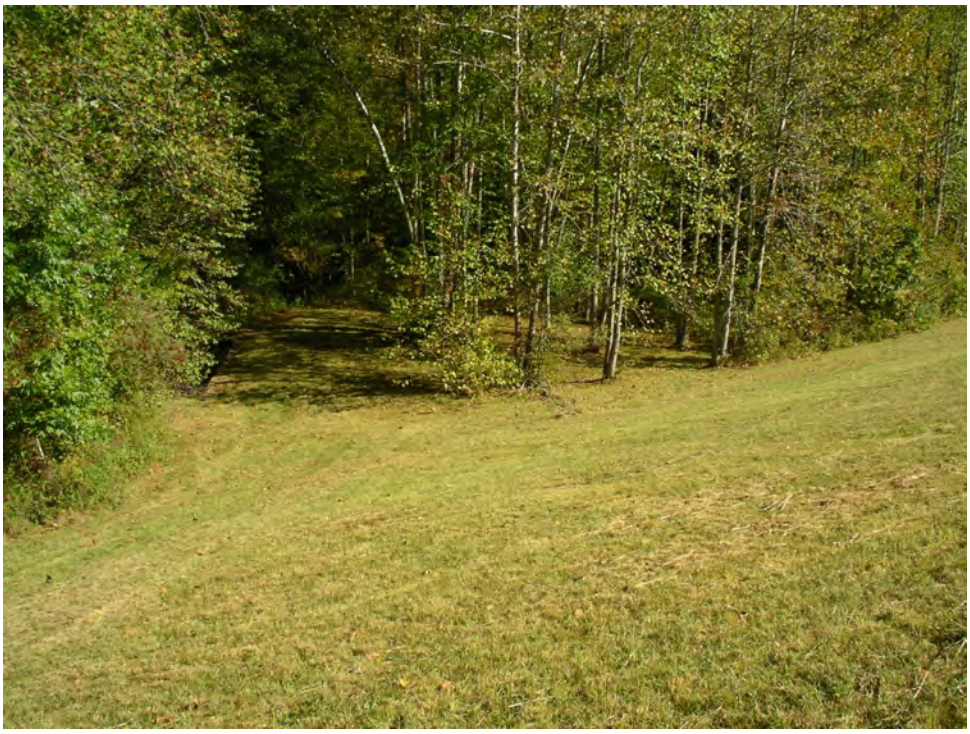


Photo 8. Right groin area of embankment.

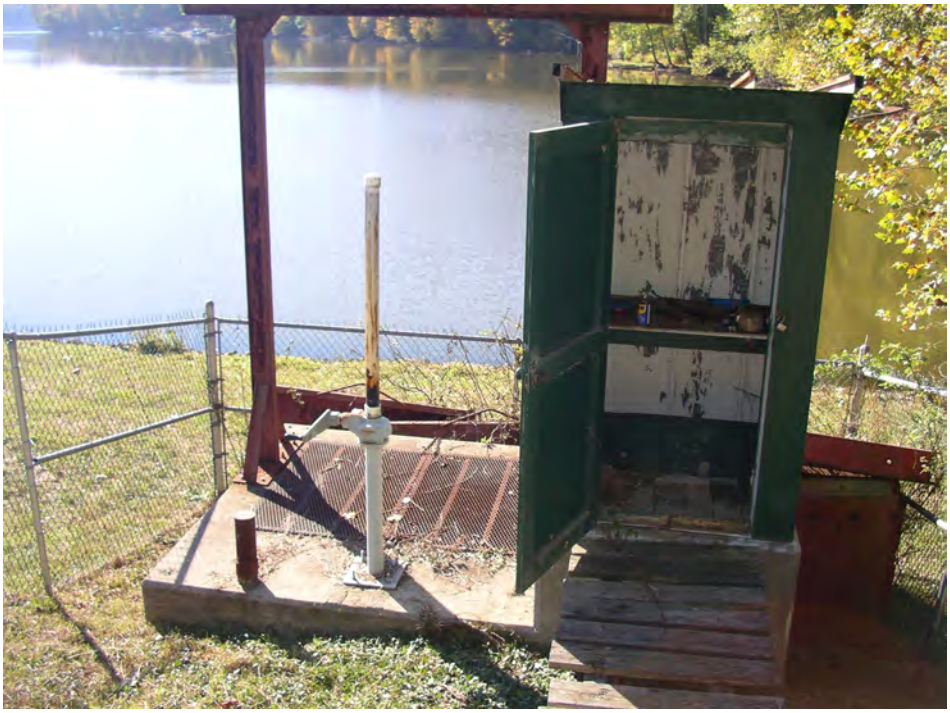


Photo 9. Gatewell structure.

Photo 10. Diver entering gatewell for inspection.

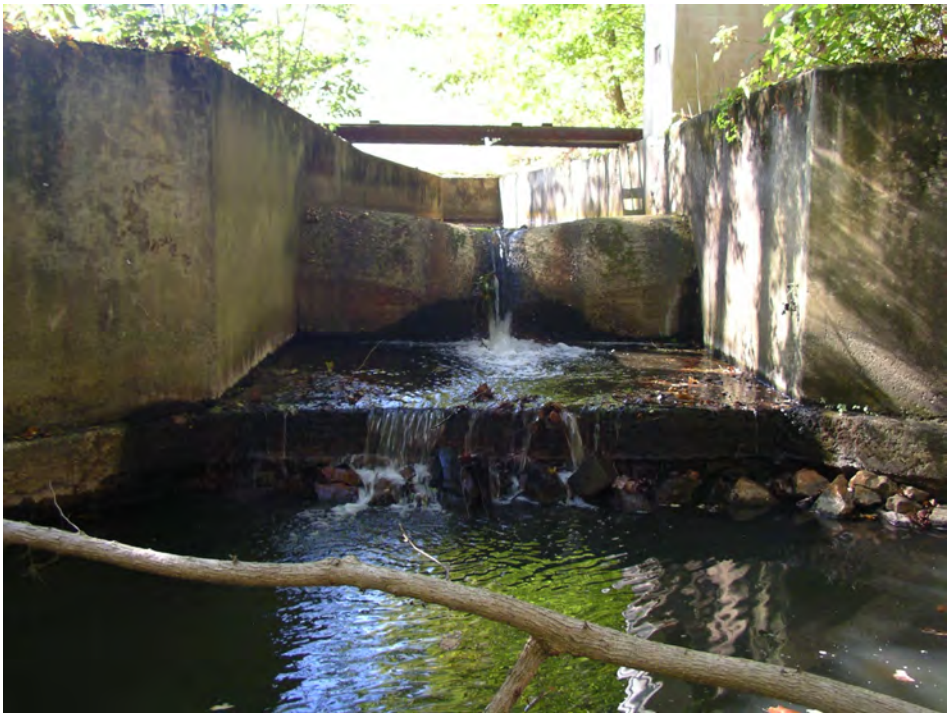


Photo 11. Stilling basin; view is towards upstream.

Photo 12. Stilling basin; view is towards downstream.

Photo 13. A crack in left stilling basin wall.

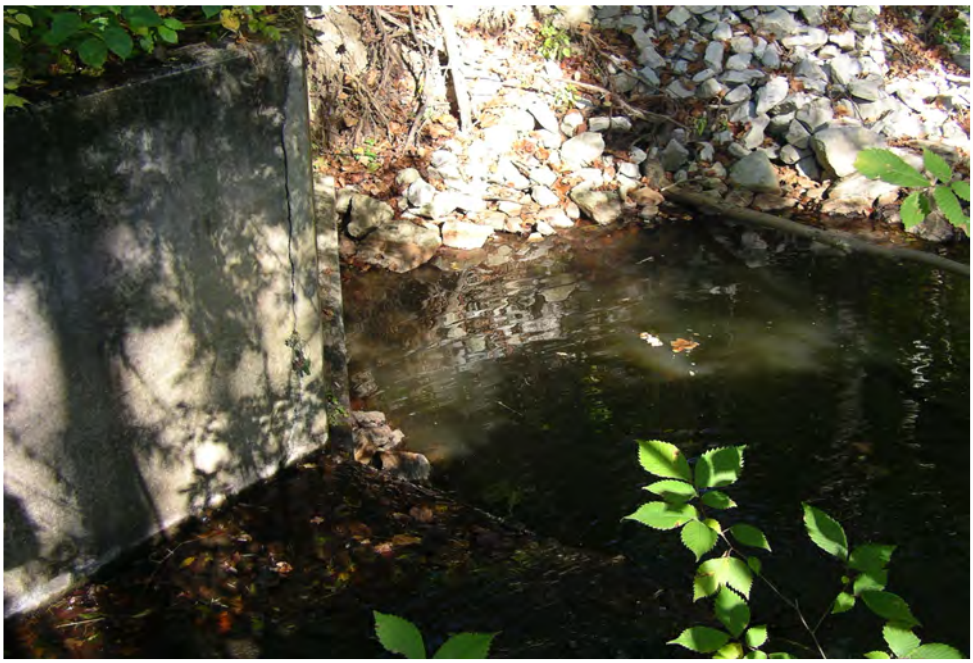


Photo 14. Scoured area immediately downstream of stilling basin concrete pad.

Photo 15. Outlet channel downstream of stilling basin.

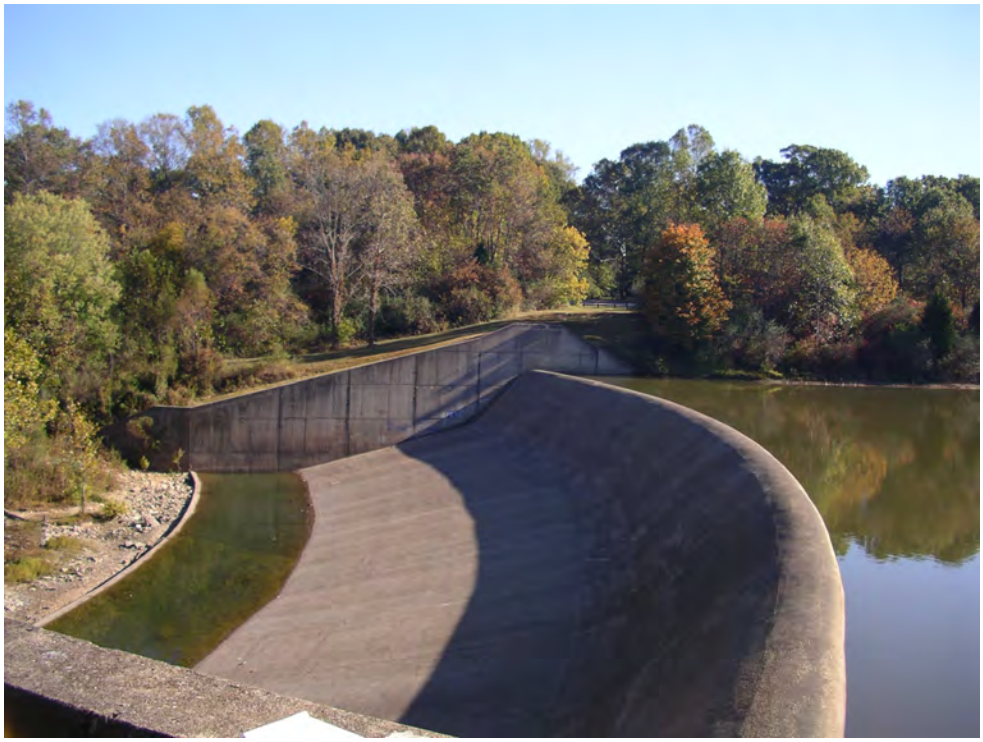


Photo 16. Crest of ogee spillway.

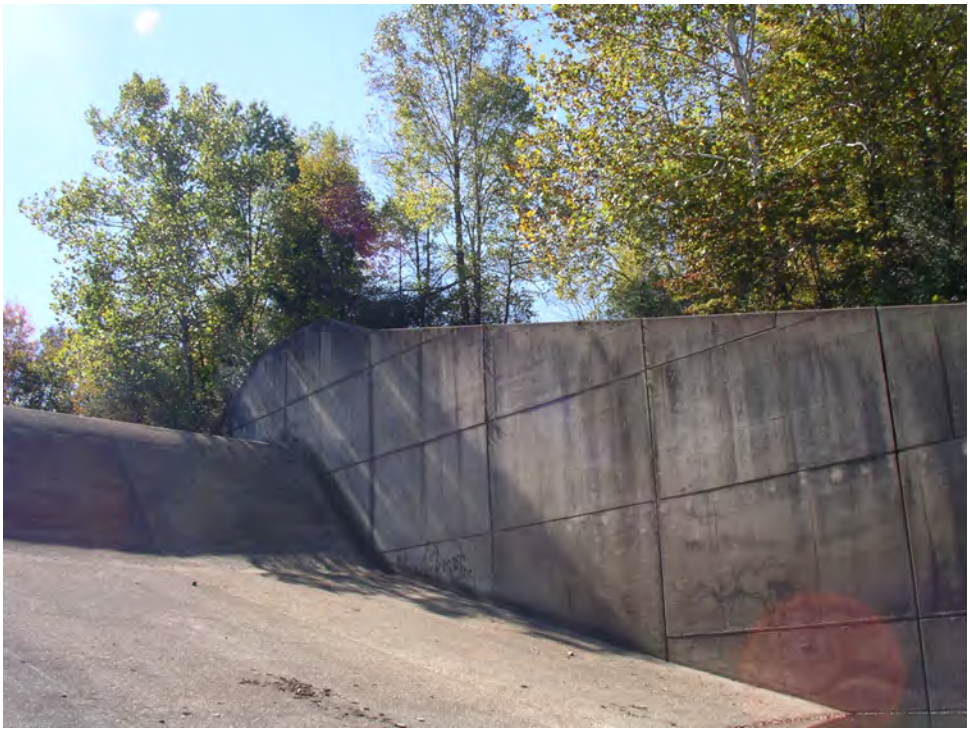


Photo 17. Left training wall of spillway.

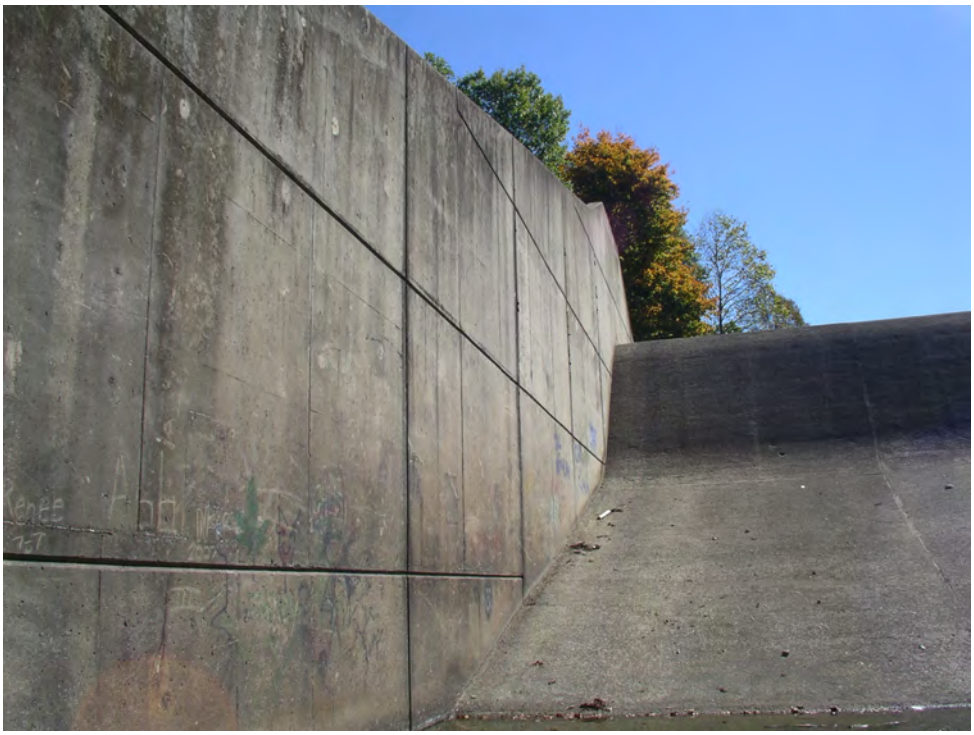


Photo 18. Right training wall of spillway.

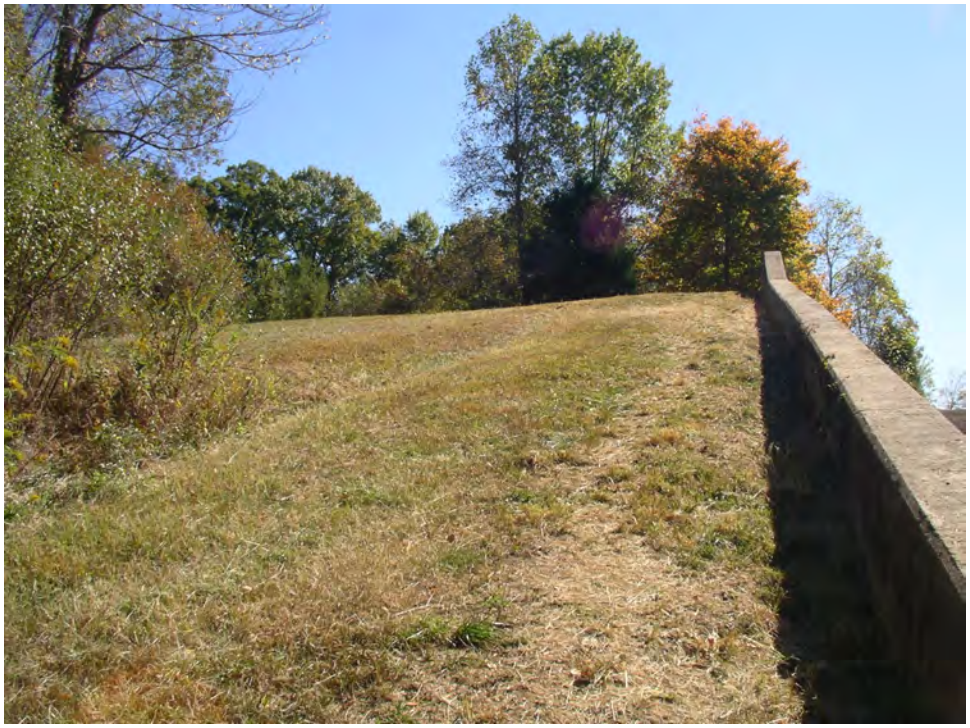


Photo 19. Sloping ground surface behind right training wall spillway.

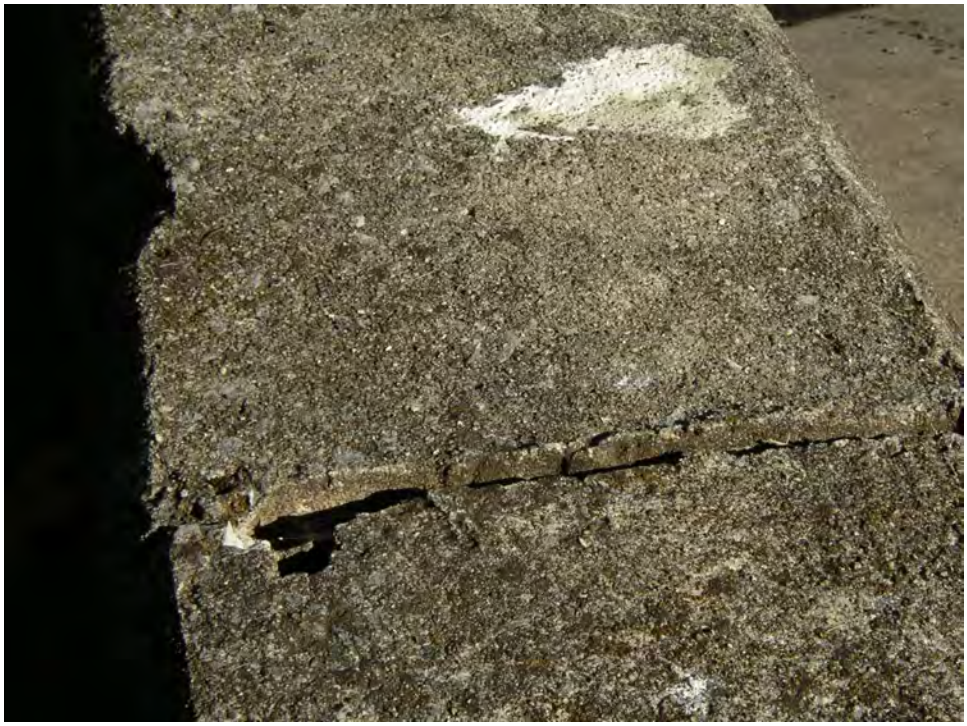


Photo 20. View of a typical joint displacement in upper end of left training wall of spillway.

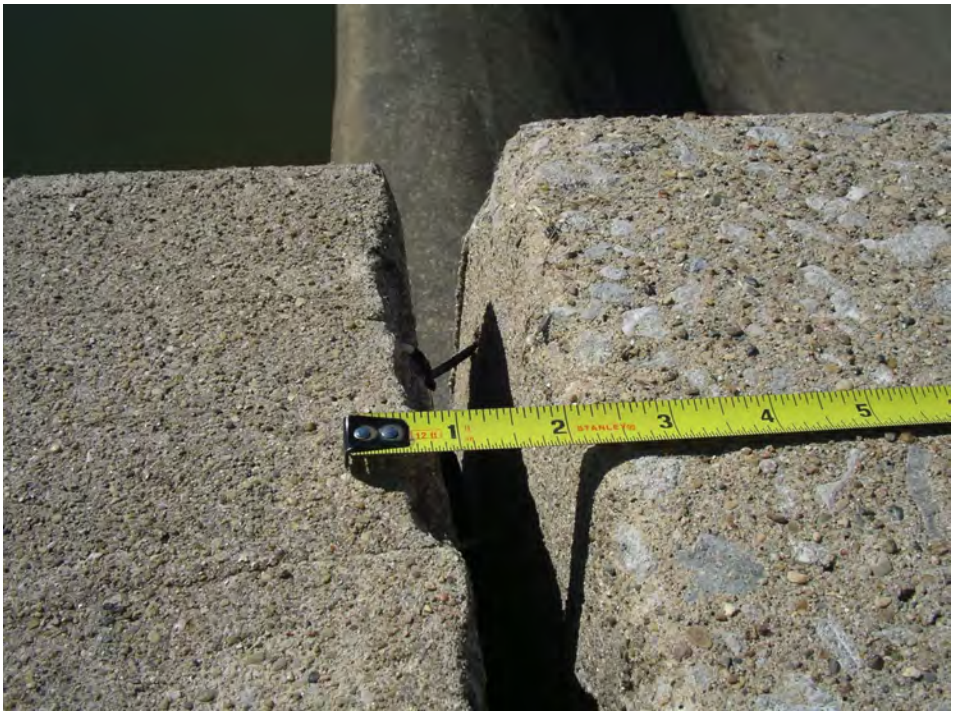


Photo 21. View of joint displacement in upper end of right training wall of spillway.

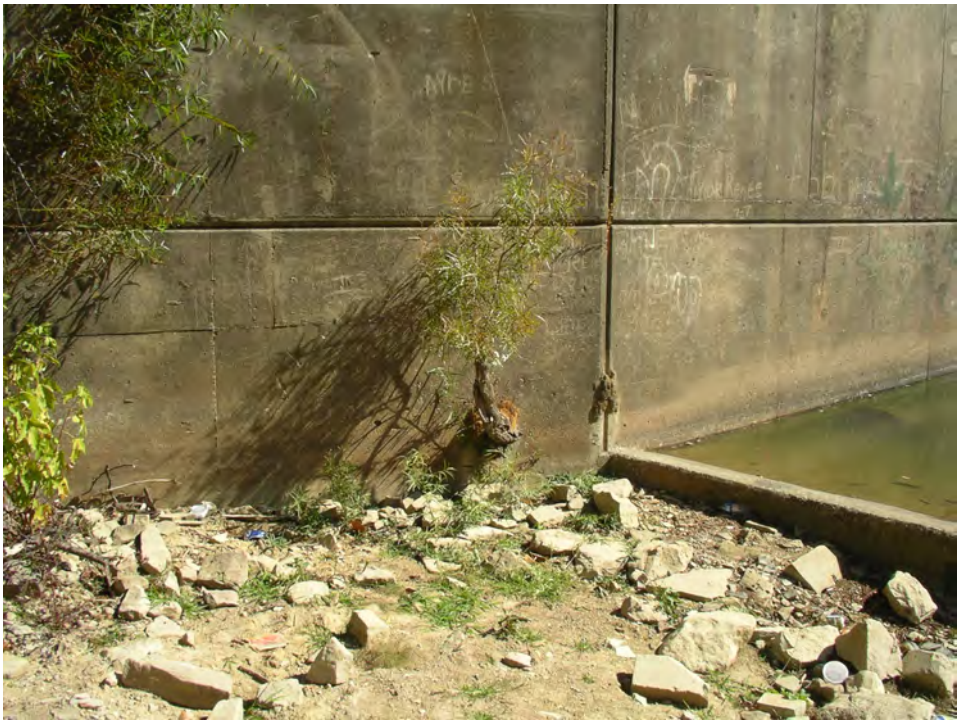


Photo 22. A small tree and “mud dauber’s nests” on lower end of right training wall of spillway.

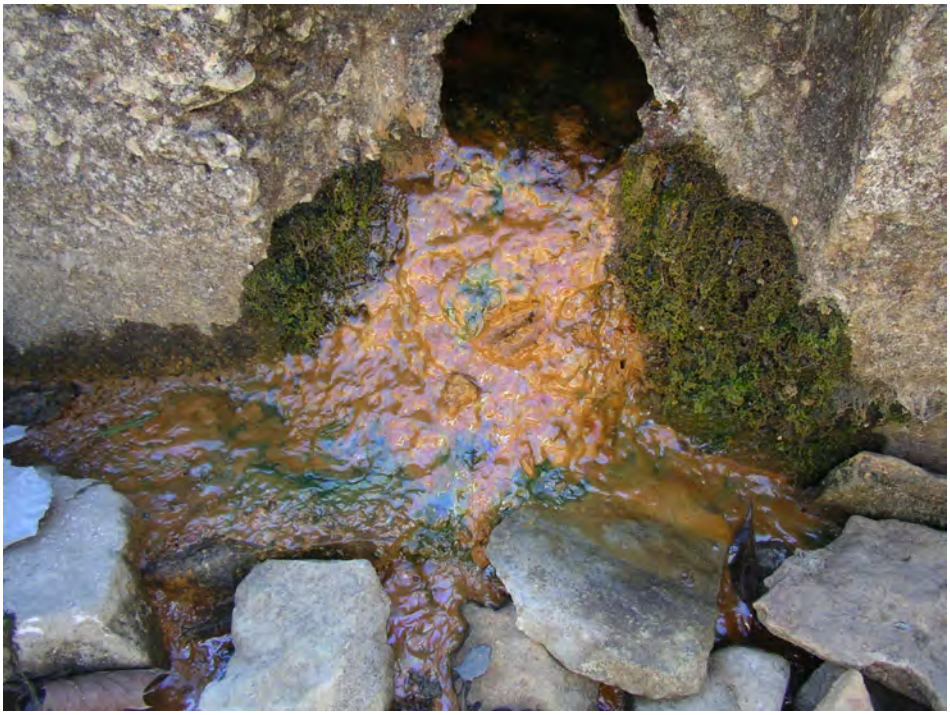


Photo 23. Brown “sticky” gelatinous substance (iron bacteria) at an outlet pipe of spillway.

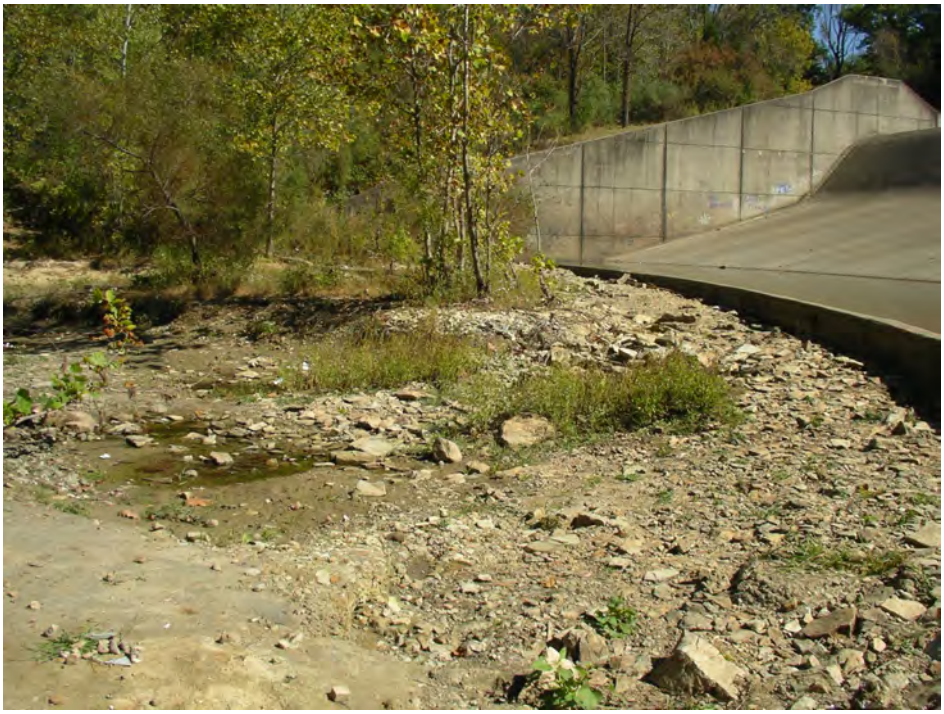


Photo 24. Minor erosion along end sill of spillway.

APPENDIX II

Outlet Works Inspection Report

C.D.S. Construction Co., Inc.
7400 Distribution Drive
Louisville, KY 40258
(502) 937-8061

October 11, 2010

Lake Lemon Conservancy District / City of Bloomington
7599 North Tunnel Road
Unionville, Indiana 47468

ATTN: Bob Madden - Phone: (812) 334-0233 Fax: (812) 335-0038

RE: Dive Inspection - Sluice gate and sluice gate well inspection, 42" intake conduit and intake grate inspection.

CDS dive crew arrived on the job site 10/5/2010 at 11:00 am EST. The sluice gate was in the closed position. The gate well was roped off and the gate well unlocked and opened. At this point fall protection was implemented in the gate well area. Temporary ladders were installed in the gate well because of poor ladder conditions. The sluice gate was raised about 4" to remove bottom sediment. After about ten minutes the gate was closed and the diver entered the water. The diver followed the gate stem down, inspecting all gate stem guides and couplings. All were found to be secure. The diver arrives at the gate and starts his gate inspection.

All gate frame and lift bracket bolts were checked for tightness. No problems were encountered at this time. (End of 42" gate inspection)

The diver exits the gate well and proceeds into the 42" intake conduit approximately 150'. At this point, the diver enters the concrete intake box on the bottom of the lake. The concrete walls and floor are in good condition. The steel bar screen that keeps logs and debris from entering the sluice gate well are showing signs of needing attention. The bars are about 4" apart and consist of 3" steel bar stock about ¼" thick. They rest on four – 4" H-beams. The flat bars are rusted almost half way through and should be replaced in the next couple of years. This will keep large logs from entering the gate well and possibly causing damage to the gate structure.

Diver exits the 42" conduit and returns to gate well and exits the water.

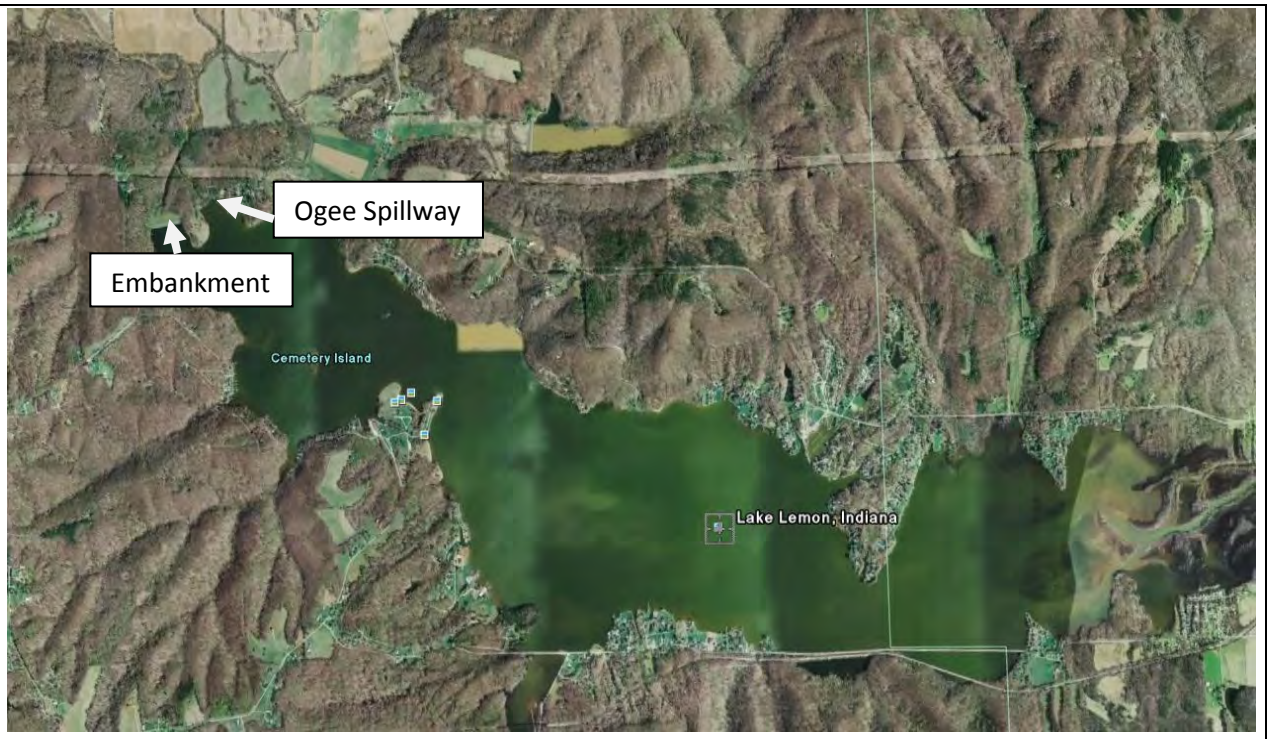
Respectfully,

Dave Colston

Dave Colston
Diving Supervisor

APPENDIX III

Picture of Dam Embankment



Picture of Dam Embankment

Name of Dam	Inspector	Date
Lake Lemon	Eric W. Tse	October 5, 2010

APPENDIX IV

Completed IDNR Dam Inspection Form

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

Name of Professional Conducting Inspection	Professional License No. (Indiana)
Eric Tse	PE10606244
Business Address: 6121 Huntley Rd., Columbus, OH 43219	Phone: (day) 614 - 888 - 0040 (evening) 614 - 531 - 4185

Company Name: DLZ Ohio, Inc.

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: Last inspection report was reviewed prior to inspection. IDNR's file on the project was also reviewed, including the original construction documents.

MULTIDISCIPINARY: 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 additional to the general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical. Yes ☒ No ☐ Comment:

Dam Name	Quad.	Date of Inspection
Lake Lemon Dam	Hindustan	10 / 5 / 2010

State Dam ID	Permit (if unapproved see pg. 6)	County	Sec.	T.	R.	Last Inspection
58-1	State Approved on Construction Completed in 1952	Monroe	28	10 N	1 E	10 / 7 / 2008

Owners Name	Owner's Phone
City of Bloomington Utilities	(812) 349-3655

Address/Zip Code: P.O. Box 1216, Bloomington, IN 47401

Contact's Name	Contact's Phone	Spillway Width	Ft. FBD.
Lake Lemon Conservancy District Bob Madden, Manager	(day) 812 - 334 - 0233 (evening) - -	Top Bot. ~330	~16

Hazard	Drainage Area	Surface Area	Height	Crest Length	Crest Width	Inlet Below Crest	Slope
High	~71 MI^2	~1700 AC	~50 FT	~660 FT	~13 FT	~16 FT	Up 3 1/2: 1 Down 3 1/2: 1

FIELD CONDITIONS OBSERVED

Water Level - Below Dam Crest ~17 Ft.

Ground Moisture Condition: Dry ____ Wet X Snowcover ____ Other ____

DRAWDOWN STRUCTURE

☒ Yes ☐ None

Comment: A 42-in. diameter R.C. pipe with a gatewell and stilling basin.

MONITORING ☐ Yes ☒ None [☐ Gage Rod ☐ Piezometers ☐ Seepage Weirs ☐ Survey Monuments ☐ Other]

Comments:

A UPSTREAM SLOPE

GOOD	X
ACCEPTABLE	
DEFICIENT	
POOR	

PROBLEMS NOTED: ☐ (A-1) None ☐ (A-2) Riprap - Missing, Sparse, Displaced, Weathered ☐ (A-3) Wave Erosion-with Scarps ☐ (A-4) Cracks-with Displacement ☐ (A-5) Sinkhole ☐ (A-6) Appears Too Steep ☐ (A-7) Depressions or Bulges ☐ (A-8) Slides ☒ (A-9) Animal Burrows ☒ (A-10) Trees, Brush, Briars ☐ (A-11) Other

Comments: A few small trees were observed along the shore. A burrow was observed on the right side of the slope, near the shore.

B CREST

GOOD	X
ACCEPTABLE	
DEFICIENT	
POOR	

PROBLEMS NOTED: ☒ (B-1) None ☒ (B-2) Ruts or Puddles ☐ (B-3) Erosion ☐ (B-4) Cracks with Displacement ☐ (B-5) Sinkholes ☐ (B-6) Not Wide Enough ☐ (B-7) Low Area ☐ (B-8) Misalignment ☒ (B-9) Inadequate Surface Drainage ☐ (B-10) Trees, Brush, Briars ☐ (B-11) Other

Comments: None

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.

DAM NAME Lake Lemon Dam STATE DAM I.D. 58-1 DATE 11 / 03 / 10

C DOWNSTREAM SLOPE

GOOD	X
ACCEPTABLE	
DEFICIENT	
POOR	

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: None

D SEEPAGE

GOOD (NONE)	X
ACCEPTABLE	
DEFICIENT	
POOR	

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** X 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: None

E PRINCIPAL SPILLWAY

GOOD	
ACCEPTABLE	X
DEFICIENT	
POOR	

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 training walls appeared unchanged since the 2008 inspection. Minor erosion had occurred immediately downstream of the end sill of the spillway. Some joints offset 1/2" to 3/4" and joint filler was squeezed out. These conditions were old and the spillway appeared to be in satisfactory condition. However, a joint in the upper end of the right training wall had widened slightly over an inch. A small tree and "mud dauber's nests" were on the lower end of the right training wall. Iron bacteria were present at outlet pipes at downstream toe, near midpoint of spillway.

F AUXILIARY SPILLWAY

GOOD	
ACCEPTABLE	
DEFICIENT	
POOR	

DESCRIPTION:_____

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:

G MAINTENANCE AND REPAIRS

GOOD	
ACCEPTABLE	
DEFICIENT	
POOR	

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.

DAM NAME Lake Lemon Dam STATE DAM I.D. 58-1 DATE 11 / 03 / 10

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:

☒ (3) Clear Trees and/or Brush From: upstream embankment slope near the shore.

☒ (4) Initiate Rodent Control Program and Properly Backfill Existing Holes: backfill a burrow on right side of upstream embankment slope near the shore

☒ (5) Repair: See below*

☐ (6) Provide Surface Drainage For:

☒ (7) Monitor: possible seep along downstream toe of embankment; following high pools, monitor for channel erosion in area downstream of spillway's end sill and monitor for standing water in area downstream of right groin of embankment; monitor animal activities on the embankment; monitor stability and erosion condition of the banks downstream of stilling basin; monitor any movement of the spillway.

☒ (8) Other:

☒ (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: for this high-hazard project.

☐ (18) Other:

☐ (19) Other:

*(5) Repair: repair scoured area downstream of end of stilling basin; replace ladder at gatewell and flat bars of trash rack; remove a small tree and mud dauber's nests from right training wall of spillway; seal all joints and cracks in training walls of spillway; remove iron bacteria from outlet pipes of spillway.

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 Recommended that lake manager continue to visually monitor possible seep on a regular basis and after significant rainfall events. Contact a qualified engineering firm if any changes are noted.

Professional Engineer's Signature Date 12/08/10

Reviewed By Date / /
Owner/Owner's Representative

DAM NAME Lake Lemon Dam STATE DAM I.D. 58-1 DATE 11 / 03 / 10

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:)

* An emergency action plan still needs to be prepared.

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. This 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: 12-08-10

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,