Loch Erin Dam

Dam Safety Inspection Report

Lenawee County, Michigan

Wolf Creek

Dam Identification Number: 441

Owner / Operator

Owner: Lenawee County

Operator: Jennifer L. Escott
Lenawee County Drain Commissioner
320 Springbrook Ave. Suite 102
Adrian, Michigan 49221
Telephone: 517-264-4696

Hazard Potential Classification

Significant

Date of Inspection
June 18, 2015

Normal Lake Level
925.36 feet NAVD88 (summer)
924.36 feet NAVD88 (winter)
Level on Date of Inspection: 924.76 feet (0.60 feet below)

Inspection and Report prepared by:

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Eng., Inc.
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Lansing, MI 48911
Telephone: (517) 887-1100

STATE OF MICHIGAN
LICENSED PROFESSIONAL ENGINEER

BRIAN J. CENC
ENGINEER NO.
53847

10/18/15
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The purpose of this dam safety inspection report and Michigan’s Dam Safety Law is to evaluate the existing condition of the dam. The report is limited to a visual investigation, review of previous inspection reports, plans and data (when available) at the time of the inspection. The contents of the report should not be treated as an in-depth engineering evaluation. Such evaluations or detailed investigations may be recommended based on the findings of this report.
CONCLUSIONS AND RECOMMENDATIONS

The Loch Erin Dam is in good condition. At the time of the visual inspection, no structural deficiencies were found that might cause a failure of the dam. The Loch Erin Dam has sufficient spillway capacity. The Loch Erin Dam has a "Significant" hazard potential classification.

This dam safety inspection report was prepared under the requirements of Michigan’s Dam Safety Act Part 315, Dam Safety of the Natural Resources and Environment Protection Act (NREPA), Act 451 of '994. The Loch Erin Dam also is a lake level control structure under Part 307 of NREPA. Dam structures under Part 307 are inspected once every three years. Previous reports are on file with the Dam Safety Program at the Michigan Department of Environmental Quality (MDEQ), Lansing, Michigan. References to previous reports are made throughout this report as for example, 2006 Report.

The following recommendations have been updated from the previous inspection reports. All of the recommendations listed in the 2012 report have been completed, monitored or updated since the previous inspections. The recommended actions listed below address any structural, hydraulic or operational deficiencies found during the visual inspection. Recommendations are listed by priority, with any estimates for quantities or costs as preliminary estimates.

1. Monitor the trees on the east side of the "legal" description compassing Embankment "D". If these trees on the east side are part of the embankment, monitor them and remove the trees as necessary. Based on the description of the embankment, these trees may not be part of the legal embankment and may be on private property.

2. Monitor vertical crack on the left downstream retaining wall of the auxiliary spillway. This can be done during monthly inspections by the operator.

3. Provide copies of the Emergency Action Plan with the Lenawee Co. Emergency Services Coordinator and the Dam Safety Program of the MDEQ.

4. Record lake levels, observations, gate operations and maintenance activities in a written log book. This is already ongoing so continue this monthly activity.
PROJECT INFORMATION

The Loch Erin Dam is located in the south half of Section 25, Town 5 South, Range 2 East, Cambridge Township, and southwest quarter of Section 30, Town 5 South, Range 3 East, Franklin Township, of Lenawee County, Michigan. From right to left (looking downstream) the dam consists of six (6) earth embankments A-F, with estimated total length of 6,970 feet. The construction plans show the main dam (embankment A) as an earth embankment with a clay center core, a key trench in the foundation with a steel sheet piling cutoff wall. There are two spillway structures that control the court-established lake levels of 925.36 feet (summer) and 924.36 feet (winter) based on North American Vertical Datum ((NAVD) of 1988.

The operator’s maps and documents refer to the first spillway as the “secondary control spillway.” It truly functions as the “principal spillway,” and will be referred to as such in this Report. It is a lake level drawdown or water level control structure and is located through earth embankment “A.” the purpose of this spillway is to regulate flow to Wolf Creek and thereby control both summer and winter lake levels for Loch Erin. This principal spillway was reconstructed in 2005-2006.

Water flow enters the principal spillway and consists of an inlet pipe with screen to an approximately 116-foot long 48-inch diameter corrugated metal pipe (CMP). This inlet pipe has been slipped lined with a 42-inch plastic pipe. Flow from the inlet pipe enters a 21.17-foot by 21.17-foot reinforced concrete vertical riser that is controlled by a slide gate. The concrete riser structure has inner and outer vaults.

Water rises up and over the inner vault wall and passes to the outer vault area via three (3) downward action weir gates at the top of the wall. Two weir gates are 2-foot high by 10-foot wide. The third weir gate is 2 feet high by 4 feet wide. Water flow can also be controlled to the outer vault by a 48-inch diameter opening with a bypass/emergency draw down slide gate. The downward acting weirs control the winter drawdown level.

Water then exits this control structure via an outlet pipe that is a 48-inch diameter CMP that has been slip lined with a 42-inch diameter plastic pipe. Water exiting the outlet pipe has its energy dissipation in the form of a natural plunge pool that was lined with riprap in 2005.

The second spillway is located in earth embankment “B.” Previous reports and plans refer to this structure as the existing primary lake level control spillway structure. However, with the reconstruction of the primary spillway, this structure acts as, and will be referred to as the “auxiliary spillway” in this Report.

The auxiliary spillway consists of a 50 foot wide fixed crest concrete overflow spillway that discharges flow to a rectangular reinforced concrete chute spillway that narrows to a 25 foot width with a total length of approximately 130 feet. The concrete chute portion of this spillway directs the flow to an energy dissipater consisting of baffles and end sill at the end of the chute. Water then flows through a constructed channel to Wolf Creek.

Repairs and modifications to the dam occurred in:
• 2004 Michigan Department of Environmental Quality Permit No. 04-46-0035-P; removed existing slide gate and operator; insert 42-inch smooth lined corrugated plastic pipe into existing 48-inch corrugated metal pipes for both inlet and outlet; and constructed new concrete drop inlet structure.

• In the mid 1980’s voids were found under the auxiliary spillway concrete chute area. Repairs were done with mud jacking under the concrete slabs. In 1999 the chute portion of the auxiliary spillway; shoreline protection with 4-inch to 10-inch riprap, 1-foot thick on geotextile fabric for embankments A and B; and lining of the natural plunge pool with 2-foot thick riprap (size not specified so assumed same as shoreline protection) was done at the auxiliary spillway.

Photographs taken during the field investigation are in Appendix A. The Photographs are in numerical order to facilitate comparison with future Reports. Location, plan, and elevation drawings of the dam are located in the Lenawee County Drain Office and the MDEQ Dam Safety Program files. Portions of those plans are provided in Appendix B. Appendix C contains the July 9, 2012 Dam Safety Inspection field report. This report compiles information reviewed and used in this report from previous Reports and the field inspection. Appendix D contains engineering data used in this report that consists of the MDEQ’s flood discharge information dated September 17, 2015.
FIELD INSPECTION

This section summarizes the observations during the dam inspection and provides background to the recommendations. Directional orientation referring to left or right in the following text is based on standing on top of the dam or earth embankment and looking downstream.

Embankments

The Loch Erin Dam has six earth embankments with a total length estimated to be 3970 feet. The letters of A – F identify the earth embankments. Appendix C, the field report, has a checklist on the observations for each of the earth embankments. The following describes the general condition for all the embankments. Specific comments and recommendations for an embankment are provided.

The upstream (u/s) slope has grass cover and riprap protection. The 1999 plans give specific details for this shoreline protection for the main dam or embankment A and embankment B. All slopes appear to be on a 3 horizontal to 1 vertical slope. The slopes of the embankments are in good condition there is no evidence of erosion, sloughing, slides, settlement, or cracks in any of the upstream slopes. Animal burrows were not observed on any of the upstream slopes. However, earth embankment E has an area where rip rap is needed about 100 feet from the easterly most part of the embankment on the shore side.

The crest of the embankments A – E have an average width of 30 feet, except for embankment F. the crest of embankment A has a bituminous road, and embankments B and C have a gravel road. The crest of each embankment is in good to excellent condition. Photographs attached in Appendix A shows a view of each specific embankment. There was no evidence of erosion, settlement or cracks in any crest.

The downstream (d/s) slopes of all the earth embankments have light to minimal tree and brush growth. The operator’s representative stated that the trees and brush growth are reviewed monthly and completely cleared in 2009. The downstream slopes vary in slope from 3.1 to 1.5 to one. The slopes are in fair to good condition.

Enough of the brush on the embankments was cleared off and all of the overgrowth noted in the 2009 report has been rectified and maintained. Specifically in 2009, two animal burrows were noted in Embankment B. Inspection of this embankment did not find any animal burrow holes and it was noted by the operator during the inspection that these were filled in after the previous inspection of this is recommended.

The development of trees and brush are a significant problem on the downstream slope of any earth embankment. It is standard dam maintenance practice to have trees and brush removed and kept off any slope of the dam’s earth embankments. Trees can be blown over by high winds resulting in the loss of embankment.
The root systems of trees can develop seepage paths that may lead to piping (loss of soil material by the movement of water). Presence of trees and brush encourages burrowing animal activity. Burrowing animals such as muskrats, beavers, and the presence of trees and brush can compromise the stability of the embankment slope. Further, thick brush on the downstream slope deters visual inspection for the development of slides, cracks, sloughs, seepage and burrowing animal activity. Therefore, proper maintenance of the dam’s earth embankments requires that tree and brush be removed and prevented from developing. Cutting trees and brush along with application of a proper herbicide to retard brush and tree redevelopment is an ongoing maintenance.

The brush and the trees on the embankments should be monitored during the monthly inspections. The trees and brush should generally be cleared to a point approximately 8 feet downstream from the downstream toe of the earth embankment. Please note that specific removal of some of the trees on Embankment D is not warranted at this time. The crest has a wide enough with and there is less than significant operating head pressure in this embankment.

The only seepage observed was at two locations along the toe of embankment “A”; all earth embankments have seepage as the flow of water, under head pressure from the impoundment, travels under and through the embankmen; and its foundation. As long as this seepage is controlled in a manner not to develop eroding velocities or cause the movement of soil particles (piping) there would be no concerns. The two locations are either side of the outlet of the principal spillway (secondary lake level control structure). The seepage is at an elevation 2-3 feet above the existing tailwater water surface elevation. There is an orange coloration seeping from this that is the ferrous oxide stain of particles as iron rich laden water oxidizes as it contacts the air and stains the soil particles. This indicates a deep flowage path of each seep. Review of the 1967 plans were discussed in the field report in Appendix C. the main dam had a deep steel sheet pile cutoff wall. Due to this cutoff and no transport of material the seepage areas appear stable at the time of inspection. It is recommended that the seepage areas be visually monitored on a monthly basis.

**Spillways**

The dam has two spillways. As used in this Report, the “secondary control spillway” reconstructed in 2005, is the principal spillway. The “fixed crest” or the “existing primary lake level control spillway” is the auxiliary spillway.

**Principal Spillway**

The principal spillway is located on earth Embankment A. Review of the spillway took place as part of the inspection.

The principal spillway is in good condition. There were no cracks, spalling, erosion or seepage along contact areas with the earth embankments. The three downward slide gates and the two slide gates were in
good to excellent operating condition. The elevation of the tailwater was above the crown of the outlet pipe. This was due to the raised streambed elevation downstream of the structure.

Review of the 2005 plans for this spillway indicates that the 2 slide gates, the first controls flow from the inlet pipe, and the second controls flow from the inner vault. Both the gates may have a leakage issue. These gates as installed, will have heads that may exceed the unsealing pressure of the gate. This was discussed with the operator's representative.

**Auxiliary Spillway**

The auxiliary spillway is located south of Embankment B. The auxiliary spillway consists of a 50-foot wide fixed crest concrete overflow spillway that discharges flow to a rectangular reinforced concrete chute spillway that narrows to a 25-foot width with a total length of approximately 130-feet. The concrete chute portion of this spillway directs the flow to an energy dissipater consisting of baffles and end sill at the end of the chute. Water then flows through a constructed channel to Wolf Creek.

The auxiliary spillway is in good condition. This spillway was reconstructed in 1999. No significant spalling or erosion was observed near the spillway. There was only one minor vertical crack in the right spillway training wall. This is an old crack with no displacement. Seepage was not observed at the contact areas with earth embankment B. The end of the chute spillway has baffle blocks and an end sill. This is the energy dissipater portion for this spillway. It appears to be in good condition. Riprap is in a plunge pool or channel area below the spillway. The riprap is still in place. This indicates either the spillway is properly controlling the energy dissipation on the apron or there is less flow passing this spillway (due to the construction of the new principal spillway).

Review of the original plans and the 1999 repair plans indicates that the installation of waterstop within the construction joints was not called for. Therefore, the chute spillway steel reinforcement may be subjected to water attack. It was also noted during the inspection that minor seepage near a joint at the left spillway abutment wall was taking place. It is recommended these areas be closely monitored for change in flow conditions.

**Structural Stability**

Based on the visual inspection of the embankments, principal and auxiliary spillway structures, the dam appears to be in a stable condition.
HYDROLOGY AND HYDRAULICS

The Loch Erin Dam has a significant hazard potential classification. Based on this classification, the dam must pass as a minimum the 200-year (0.5% chance) design flood per Section 31516 of Michigan's Dam Safety Act (Part 315 of Act 451, Public Acts of 1994). The MDEQ is providing design flood information. At the time of this report the flood flow information from them was not sent back yet. A copy of the email from 2009 is included in Appendix D and as soon as the flood flow data is returned to the operator it will be forwarded to the Dam Safety Unity as an addendum to this 2012 report.

Per spillway rating table provided in Appendix C of the 2006 Report, the principal spillway has an estimated capacity of approximately 215 cfs, and the auxiliary spillway will have a capacity of 193 cfs at elevation 926.50-feet NAVD88. This is greater than the 410 cfs required and provides 2.8-feet of freeboard. Therefore, the dam has sufficient spillway capacity.
OPERATION AND MAINTENANCE

Operation and maintenance of the dam is the responsibility of the owner’s caretaker and Lenawee County Drain Commissioner. The Drain Commissioner’s representative monitors daily operations of the dam with a System Control and Data Acquisition (SCADA) system called Mission Control. Lake levels are reported instantaneously and reported to a web based system. Implementation of maintenance items is coordinated through the Lenawee County Drain Commissioner Office. At a minimum, monthly field inspections of the dam, its earth embankments, and the control structures are done. In December of 2014 a de-icer was installed to prevent freezing of the transducer that provides information to the Mission Control monitoring system. See photos of it in operation.

A written O&M plan does not exist for the Loch Erin Dam. The development of a written O&M is recommended. Items to be included in the O&M plan are discussed below.

The principal spillway of this dam may require the presence of an operator during high flow events. However, continuous off site monitoring of the lake levels directs the need for on-site personnel to operate the gates. The new principal spillway requires maintenance of the slide gates operators. Operation and maintenance activities should be recorded in a bound logbook to document monitoring and maintenance items performed. The earth embankment slopes need monitoring and periodic maintenance in mowing and tree and brush control. Remove trees and brush and periodically apply herbicide to maintain the embankments. Remove burrowing animals and plug holes. Probe the end sill area of the auxiliary spillway once a year during low flow periods. Also, sound the concrete and monitor for any flow through the construction joints.

Due to the significant hazard potential rating an Emergency Action Plan (EAP) is required under Part 315 of NREPA. An EAP exists but needs to be updated. Comments on the existing plan were verbally provided to the operator’s representative at the inspection. It is the responsibility of the owner to annually update the EAP and notify the MDEQ at the time of the submittal of this Part 315 inspection report.
APPENDIX A: PHOTOGRAPHS

Photographs are used for the comparison of any change in conditions and documentation of previous and future reports.

Control Structure

Outlet Control Structure

De-Icer in Operation

Dike A East End
Dike A Shoreline

Dike A

Dike B South End

Dike B North End
APPENDIX B: FIGURES

Figures are sketches or drawings from information on file with the MDEQ.
Temporary Berm shall be approximately 2' tall and shall be underlain with non-woven geotextile fabric.
APPENDIX C: FIELD REPORT

DAM SAFETY INSPECTION FIELD REPORT

1. Name of Dam: Loch Erin
   Dam ID No. 441
   Date: June 18, 2015

2. Owner(s): Lenawee County
   Operator: Jennifer L. Escott, Lenawee County Drain Commissioner, 320 Springbrook Avenue, Adrian, MI, 49221, (517) 264-4696 and assigned staff:
   Joseph Brezvai, Engineer II, Lenawee County Drain Commissioners Office

3. Location of Dam: South ½ Section: 25, Town: 5 South, Range: 2 East, Cambridge Twp., and Southeast 1/4, Section 30, Town 5 South, Range 3 East, Franklin Twp.
   County: Lenawee
   River: Wolf Creek

4. Persons Present at Inspection:
   \begin{tabular}{|l|l|}
   \hline
   Name & Title \\
   Brian J. Cenci, P.E. & Consultant \\
   Joseph P. Brezvai & Operators Representative, Drain Engineer II \\
   \hline
   \end{tabular}

5. Description of Dam: From right to left (looking downstream) the dam consists of six (6) earth embankments, identified as embankments A-F, with estimated total length of 3,970-feet. The structural heights of the embankments range from 5 to 18-feet in structural height. Per the 1967 plans for construction, the main dam (embankment A) was a zoned earth embankment with a clay center core, key trenched and steel sheet piling cutoff wall. There are two spillway structures that control the court-established lake levels of 925.36-feet (summer) and 924.36-feet (winter) based on North American Vertical Datum (NAVD) of 1988.

   The operator’s maps and documents refer to the first spillway as the “secondary control spillway.” It truly functions as the “principal spillway,” and will be referred to as such in this Report. It is a lake level drawdown or water level control structure and is located through earth embankment “A.” The purpose of this spillway is to regulate to Wolf Creek and thereby control both summer and winter lake levels for Loch Erin. This principal spillway was reconstructed in 2005-2006.
Water flow enters the principal spillway and consists of an inlet pipe with screen to an approximately 116-foot long 48-inch diameter corrugated metal pipe (CMP). This inlet pipe has been slipped lined with a 42-inch plastic pipe. Flow from the inlet pipe enters a 21.17-foot by 21.17-foot reinforced concrete vertical riser and can be controlled by a slide gate. The concrete riser structure has inner and outer vaults.

Water rises up and over the inner vault wall and passes to the outer vault area via three (3) downward action weir gates at the top of the wall. Two weir gates are 2-foot high by 10-foot wide. The third weir gate is 2-foot high by 4-foot wide. Water flow can also be controlled to the outer vault by a 48-inch diameter opening with a bypass/emergency draw down slide gate. The downward acting weirs control the winter drawdown level.

Water then exits this control structure via an outlet pipe that is a 48-inch diameter CMP that has been slip lined with a 42-inch diameter plastic pipe. Water exiting the outlet pipe has its energy dissipation in the form of a natural plunge pool that was lined with riprap in 2005.

The second spillway is located in the earth embankment “B.” Previous reports and plans refer to this structure as the existing primary lake level control spillway structure. However, with the reconstruction of the primary this structure acts as, and will be referred to as the "auxiliary spillway" in the Report.

The auxiliary spillway consists of a 50-foot wide fixed crest concrete overflow spillway that discharges flow to a rectangle reinforced concrete chute spillway that narrows to a 25-foot width with a total length of approximately 130-feet. The concrete chute portion of this spillway directs the flow to an energy dissipater consisting of baffles and end sill at the end of the chute. Water then flows through a constructed channel to Wolf Creek.

6. Dam Owner Questionnaire Completed? Yes X No

7. Prior Inspections:
   7/9/2012 by Brian Cenci, P.E., Eng., Inc. (formerly Fitzgerald Henne & Associates, Inc.)
   10/10/2006 by Peter N Chapman, P.E., Spicer Group Inc.
   Last, 5/21/2009 by Gary F. Croskey, P.E.
   Since 1991, per Part 307 of Natural Resources and Environmental Protection Act (NREPA or Inland Lake Level Act) utilizes Part 315 reports. Prior to 1991 just triennial dam safety inspection to the Michigan Department of Natural Resources (MDNR)
8. Hazard Potential Classification: **SIGNIFICANT**

**ENGINEERING DATA**

1. **Vicinity Map:** 1967 Plans for MDNR, Dam Construction Permit 67-9, and 2005 Plans by Progressive AE.

2. **Geology Reports:** No report, however, soil borings are on 1967 Plans for Dam Construction Permit 67-9. Borings #11 - #16 at each earth embankments B-F found clay loam and hard brown clay. Borings #1 - #6 at "dam site" or embankment A had brown and gray sand and gravel to a elevation depth of approximately 870 to 875 feet, or approximately 51 to 56 feet below the designed water surface elevation of the impoundment. The upstream cutoff trench had borings #7 - #10 of approximately 5-6 feet of depth had hard brown clay between elevations 915 to 925 feet. A 20 foot high steel sheet piling cutoff wall was to be driven from elevation 912 feet to 892 feet, within the key trench and clay filled zone of the dam.

3. **Design Analysis:** None, however, 1967 Plans approved by MDNR under Dam Construction Permit 67-9. Note other plans in 1991 and 2004 (see #4 below).


**CONSTRUCTION DATA**

2. Post Construction Surveys: MDNR, 1999 plans used assumed datum (not on plans), and 2005 Progressive AE Plans in 2004 established fixed crest was at elevation 925.36 feet NAVD of 1988 and was bases for reflowing of lake level.


4. Modifications: In the mid 1980's voids were found under the auxiliary spillway concrete chute area. Repairs were done with mud jacking under the concrete slabs. In 1999 reconstruct with a new concrete slab on chute of auxiliary spillway; shoreline protection with 4-inch to 10-inch riprap, 1-foot thick on geotextile fabric for embankments A and B; and lining of the natural plunge pool with 2-foot thick riprap (size not specified assumed same as shoreline protection) was done at the auxiliary spillway.

In 2004 Michigan Department of Environmental Quality Permit No. 04-46-0035-P; remove existing slide gate and operator; insert 42-inch smooth corrugated plastic pipe into exiting 48-inch corrugated metal pipe for both inlet and outlet; and constructed new concrete drop inlet structure.

5. Borrow Sources: Assumed local or native material on site.

OPERATION & MAINTENANCE DATA

1. Operation & Maintenance Plan and Procedures: However records on operation and maintenance activities are kept at the office.

   There exists an agreement with the City of Adrian. The agreement states the City has the right to the first 7-1/2" of water present on May 1 of every year. The operator’s representative noted the agreement has never been enacted.

2. Monitoring Systems: Yes, a SCADA system called “Mission Control.” Mission control uses a pressure transducer located in an air bubbler system by the County’s storm water pump station at Embankment “A”. There are staff gages at the left upstream wingwall of the auxiliary spillway, and at the bubbler system. Continuous lake levels are transmitted and maybe available on the internet or website used by the county to monitor its various water systems.

3. Impoundment Level Records: Yes

4. O&M Records: At Lenawee County Drain Office
5. Dam Incidences/Reports: Mid 1980's voids under concrete chute were investigated and repaired by mud jacking. Subsequently in 1999 the concrete slab was removed and poured.

Commented to operator's representative that 1999 plans lack waterstops in construction joints.

6. Pictures:
   
   2006 Report

**INSTRUMENTATION**

1. Monuments, Benchmarks, Surveys: 1967 plans used 2 Benchmarks based on apparently mean sea level (m.s.l or NGVD29) datum, and had auxiliary spillway’s fixed crest elevation at 926.0 feet. One by Right abutment of embankment "A" pike in root of apple tree 100' west of dam, elevation 935.09. Second, top of monument S ¼ section 25, elevation 924.55 feet. The 1999 plans had used an assumed datum that showed lake level at elevation 94.80 feet. 2005 plans by Progressive AE had used NAVD of 1988 (NAVD88) to verify auxiliary spillway’s fixed crest elevation to at 925.35 feet. Plans had 3 benchmarks identified. One BM appears to be common with 1967 plans. Its at apple tree and has elevation of 935.45 feet.

The conversion is NAVD88 = NGVD29 − 0.39 feet.

2. Observation Wells: None.

3. Weirs: None used for monitoring embankment seepage flows

4. Piezometers: None

5. Stream Gage Recorder: None, note lake level monitoring by pressure transducer of SCADA "Mission Control System."

**DATA**

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<th>930 feet</th>
<th>Length of Dam</th>
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<td>Elevation Top of Dam</td>
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<td>Elevation Normal Pool</td>
<td>925.36 feet</td>
<td>Top Width</td>
<td>Varies feet</td>
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<td>Elevation Tailwater</td>
<td>912 feet</td>
<td>Structural Height</td>
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<td>Elevation Streambed</td>
<td>907.36 feet</td>
<td>Hydraulic Height (Head)</td>
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<td>622 acres</td>
<td>Normal Pool Capacity</td>
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<td>Maximum Pool Area</td>
<td>+630 acres</td>
<td>Maximum Pool Capacity</td>
<td>4665 ac-ft</td>
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Note: Based on 2005 Progressive AE plans using NAVD 1988 datum, and correcting 1967 plans elevation subtracting 3.64 feet.

RESERVOIR

1. Slope: Flat to rolling hills.
2. Bank: Rolling hills and residential areas.
3. Sedimentation: Minimal due to upstream dams and natural lakes.

EARTH EMBANKMENTS

Main: ____ Left: ____ Right: ____ Other: A or Main Dam  Total Length: 330-feet
Note: Y=yes  N=no  P=photo

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Grass Cover

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Riprap

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<th>DOWNSTREAM</th>
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Cracks

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Animal Burrows

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<th>UPSTREAM</th>
<th>DOWNSTREAM</th>
<th>CREST 30' wide</th>
<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>None seen</td>
<td>None seen</td>
<td>N</td>
<td>None seen</td>
<td>None seen</td>
<td>None seen</td>
</tr>
</tbody>
</table>

Seepage Boils

<table>
<thead>
<tr>
<th>Slough Beaching</th>
<th>UPSTREAM</th>
<th>DOWNSTREAM</th>
<th>CREST 30' wide</th>
<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Y 5</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
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</table>

Drains

<table>
<thead>
<tr>
<th>Debris</th>
<th>UPSTREAM</th>
<th>DOWNSTREAM</th>
<th>CREST 30' wide</th>
<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

COMMENTS:

1. Bituminous road
3. Natural plunge pool and downstream channel lined with rip rap.
4. Operator reported stone rip rap placed to deter erosion from agricultural land to the west of the abutment.

5. Small seepage areas each side of the plunge pool area. They appear very minor and are stable.

6. Recommended to mow slopes as necessary.

7. The "mission control" SCADA for lake level monitoring is located at this earth embankment.

---

**EARTH EMBANKMENTS**

Main: ___ Left: ___ Right: ___ Other: B Total Length: 1270-feet

Note: Y=yes  N=no  P=photo

<table>
<thead>
<tr>
<th></th>
<th>UPSTREAM</th>
<th>DOWNSTREAM</th>
<th>CREST 30’ wide</th>
<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Slope (horiz:vert)</strong></td>
<td>3:1</td>
<td>1:5:1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Grass Cover</strong></td>
<td>Y P</td>
<td>Y</td>
<td>Y - 1</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Trees, Brush, etc.</strong></td>
<td>N</td>
<td>Y - 2</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Riprap</strong></td>
<td>Y P</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Erosion</strong></td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Cracks</strong></td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Settlement</strong></td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Animal Burrows</strong></td>
<td>None seen</td>
<td>Y P - 3</td>
<td>N</td>
<td>None seen</td>
<td>None seen</td>
</tr>
<tr>
<td><strong>Debris</strong></td>
<td>N</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Seepage Boils</strong></td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Slough Beaching</strong></td>
<td>N</td>
<td>N/A</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Drains</strong></td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

**COMMENTS:**

1. Gravel road

2. Brush and tree removal took place in 2009. Spraying of slopes has occurred to deter vegetation.

3. No animal burrows found, as noted in 2009 inspection report.
## EARTH EMBANKMENTS

Main:__ Left:__ Right:__ Other: C Total Length: 1000-feet
Note: Y=yes N=no P=photo

<table>
<thead>
<tr>
<th></th>
<th>UPSTREAM</th>
<th>DOWNSTREAM</th>
<th>CREST 30' wide</th>
<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope (horiz:vert)</td>
<td>3:1</td>
<td>1:5:1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Grass Cover</td>
<td>Y</td>
<td>Y</td>
<td>Y 1</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Trees, Brush, etc.</td>
<td>N</td>
<td>Y 2 &amp; 3</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Riprap</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Erosion</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Cracks</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Settlement</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Animal Burrows</td>
<td>None seen</td>
<td>None seen</td>
<td>N</td>
<td>None seen</td>
<td>None seen</td>
</tr>
<tr>
<td>Debris</td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
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<td>N</td>
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<tr>
<td>Seepage Boils</td>
<td>N/A</td>
<td>N 3</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Slough Beaching</td>
<td>N</td>
<td>N/A</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Drains</td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

**COMMENTS:**

1. Gravel road (ending at a private residence)
2. Brush and tree removal took place in 2009. Spraying of slopes has occurred to deter vegetation.
EARTH EMBANKMENTS

Main: ____ Left: ____ Right: ____ Other: D Total Length: 300-feet
Note: Y=yes N=no P=photo

<table>
<thead>
<tr>
<th></th>
<th>UPSTREAM</th>
<th>DOWNSTREAM</th>
<th>CREST 30' wide</th>
<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope (horiz:vert)</td>
<td>3:1</td>
<td>2-1:5:1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Grass Cover</td>
<td>Y</td>
<td>Y 1</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Trees, Brush, etc.</td>
<td>Y</td>
<td>Y 2</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Riprap</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Erosion</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Cracks</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Settlement</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Animal Burrows</td>
<td>None seen</td>
<td>None seen</td>
<td>N</td>
<td>None seen</td>
<td>None seen</td>
</tr>
<tr>
<td>Debris</td>
<td>N</td>
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<tr>
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<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Drains</td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

COMMENTS:
1. Trees are large evergreens along toe and ditch of Reed Road. May leave as no seepage or animal activity in area.
EARTH EMBANKMENTS

Main: ____ Left: ____ Right: ____ Other: E Total Length: 900-feet
Note: Y=yes N=no P=photo

<table>
<thead>
<tr>
<th></th>
<th>UPSTREAM</th>
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<th>CREST 30' wide</th>
<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope (horiz:vert)</td>
<td>3:1</td>
<td>3:1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Grass Cover</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Trees, Brush, etc.</td>
<td>Y 1 P</td>
<td>N P</td>
<td>N P</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Riprap</td>
<td>Y P</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Erosion</td>
<td>N</td>
<td>N</td>
<td>N</td>
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</tr>
<tr>
<td>Cracks</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Settlement</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Animal Burrows</td>
<td>None seen</td>
<td>None seen</td>
<td>N</td>
<td>None seen</td>
<td>None seen</td>
</tr>
<tr>
<td>Debris</td>
<td>N</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Seepage Boils</td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Slough Beaching</td>
<td>N</td>
<td>N/A</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Drains</td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

COMMENTS:
1. Apply rip rap as necessary on several bare areas.
2. Remove trees as necessary and monitor vegetation.
EARTH EMBANKMENTS

Main: ____ Left: ____ Right: ____ Other: ___ Total Length: 170-feet
Note: Y=yes  N=no  P=photo

<table>
<thead>
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<th>LEFT ABUT</th>
<th>RIGHT ABUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope (horiz:vert)</td>
<td>3:1</td>
<td>3:1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Grass Cover</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Trees, Brush, etc.</td>
<td>Y 1</td>
<td>Y 1</td>
<td>Y 1</td>
<td>Y 1</td>
<td>Y 1</td>
</tr>
<tr>
<td>Riprap</td>
<td>N</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Erosion</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Cracks</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Settlement</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Animal Burrows</td>
<td>None seen</td>
<td>None seen</td>
<td>N</td>
<td>None seen</td>
<td>None seen</td>
</tr>
<tr>
<td>Debris</td>
<td>N</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Seepage Boils</td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Slough Beaching</td>
<td>N</td>
<td>N/A</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Drains</td>
<td>N/A</td>
<td>N</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

COMMENTS:
1. Appears in good condition.
2. Monitor trees and vegetation, remove brush as necessary.
SPILLWAYS AND OUTLETS

1. **Types and locations:** Principal Spillway is located in earth embankment “A.” The structure now consists of an inlet pipe with screen to an approximately 116-foot long 48-inch plastic pipe. Flow from the inlet pipe enters a 21.17-foot by 21.17-foot reinforced concrete vertical riser and can be controlled by a slide gate. The concrete riser structure has inner and outer vaults.

Water rises up and over the inner vault wall and passes to the outer vault area via three (3) downward action weir gates at the top of the wall. Two weir gates are 2-foot high by 10-foot wide. The third weir gate is 2-foot high by 4-foot wide. Water flow can also be controlled to the outer vault by a 48-inch diameter opening with a bypass/emergency draw down slide gate. The downward acting weirs control the winter drawdown level.

Water then exits this control structure via an outlet pipe that is a 48-inch diameter CMP that has been slip lined with a 42-inch diameter plastic pipe. Water exiting the outlet pipe has its energy dissipation in the form of a natural plunge pool that was lined with riprap in 2005.

2. **Condition:** Good
   - **Cracks:** None observed
   - **Displacement:** None observed
   - **Spalling:** None observed
   - **Erosion:** None observed
   - **Seepage and Drainage:** None at structure contact points. See earth embankment “A.”

3. **CONTROLS:**
   - **Gates:** 3 downward slide gates that act as weirs. These 3 slide gates controls flows from the concrete riser’s inner vault to outer vault. Two slide gates control flow into and out of the inner vault. All gates appear to be in good operational condition.
   - **Stoplogs:** None.
   - **Operator/Hoists:** 5 operators for slide gates.
   - **Trashrack:** Inlet screen for inlet pipe to principal spillway.

4. **Inlet Channel:** Loch Erin impoundment area.

5. **Outlet Channel:** Wolf Creek. Temporary earth berm or now channel bottom elevation of Wolf Creek at principal spillway is backing water to an elevation higher than crown of outlet pipe.

6. **Other/Rating Tables/Charts etc.:** See Appendix C of 2006 Report.
SPILLWAYS AND OUTLETS

1. **Types and locations:** Auxiliary Spillway; The auxiliary spillway consists of a 50-foot wide fixed crest concrete chute spillway that narrows to a 25-foot width with a total length of approximately 130-feet. The concrete chute portion of this spillway directs the flow to a energy dissipater consisting of baffles and end sill at the end of the chute. Water then flows through a constructed channel to Wolf Creek.

2. **Condition:** Good
   - **Cracks:** Minor vertical crack.  
   - **Displacement:** None  
   - **Spalling:** None  
   - **Erosion:** None  
   - **Seepage and Drainage:** None

3. **CONTROLS:**
   - **Gates:**  
   - **Stoplogs:** None  
   - **Operator/Hoists:**  
   - **Trashrack:** None

4. **Inlet Channel:** Lcch Erin impoundment area.

5. **Outlet Channel:** Wolf Creek

6. **Other/Rating Tables/Charts etc.:** See Appendix C of 2006 Report.
HYDROLOGIC AND HYDRAULIC DATA

HYDROLOGY
Below you can see previous data and information from 2006, 2009, and 2012 inspections.

<table>
<thead>
<tr>
<th>Flood Frequency</th>
<th>2012</th>
<th>2009</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cfs</td>
<td>acre-feet</td>
<td>cfs</td>
</tr>
<tr>
<td></td>
<td>Inflow/Outflow</td>
<td></td>
<td>Inflow/Outflow</td>
</tr>
<tr>
<td>0.5%</td>
<td>1400/70</td>
<td>1500</td>
<td>1500/410</td>
</tr>
<tr>
<td>1.0%</td>
<td>1200/330</td>
<td>1200</td>
<td>?/330</td>
</tr>
<tr>
<td>2.0%</td>
<td>1100/270</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage Area Total (sq mi)</td>
<td>18.4</td>
<td>18.4</td>
<td>18.3</td>
</tr>
<tr>
<td>Drainage Area Contributing (sq mi)</td>
<td>17.8</td>
<td>17.8</td>
<td>17.7</td>
</tr>
</tbody>
</table>

Notes: 2009 data from MDEQ email dated May 28, 2009.

HYDRAULIC – Spillway Capacities, Rating Tables/Curves, and Questions
1. Description of principal spillway, including stilling basin.

Are plans available: _X_ Yes ____No

Capacity in cfs: 2006 report stated 215 cfs at elevation 926.5-feet. This would be at winter operation of gates.

2. Description of auxiliary spillway, including stilling basin.

Are plans available: _X_ Yes ____No

Capacity in cfs: 2006 Report's, Appendix C had 193 cfs at elevation 926.5-feet.

3. Storage capacity curves for reservoir:

<table>
<thead>
<tr>
<th>Elevation (feet)</th>
<th>Area (acres)</th>
<th>Capacity (acre-feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>926</td>
<td>622</td>
<td>4665</td>
</tr>
<tr>
<td>927.5</td>
<td>N/A</td>
<td>6335</td>
</tr>
</tbody>
</table>

Notes: Data from State of Michigan Dam Inventory (2006 data). Approximately, 1,671 ac-feet of storage is available.

4. Please attach one graph displaying the spillway and tailwater rating curves. See 2006 Report Appendix C.

5. Sensitivity analysis of estimated flows.
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Flow (cfs)</th>
<th>Pool Elevation (ft)</th>
<th>Tailwater Elevation (ft)</th>
<th>Head (ft) (pool Elev. - Tailwater Elev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5% (200-yr)</td>
<td>410</td>
<td>926.5</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>1.0% (100-yr)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0% (50-yr)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Data from 2006 Report. This would give a freeboard of approximately 2.86-feet.

6. State development in downstream floodplain at various elevations:
   Rural agricultural land with county roads.

7. Has downstream development constrained use of any outlet works or spillways?
   NO.

8. Will downstream erosion resulting from normal or design flood discharges jeopardize the safety of the structure?
   NO.

9. Have ice jams or debris affected past operation of the dam? (past history of any occurrence should be included if available).
   NONE REPORTED AT INSPECTION.

10. What is the existing hydraulic capacity of the structure (no freeboard). What is the probability of its capacity being exceeded?
    > 410 cfs, 1,500 ac-ft

11. Give the magnitude of the recommended spillway design flood in terms of discharge, and volume in acre-feet?
    410 cfs, 1,500 ac-ft

What percent of maximum storage capacity of the dam is this runoff volume? 1671 ac-feet of storage is available.
    1500/1671 = 0.90 or 90%.

12. What is the most probable mode of hydraulic failure? This answer should include:
    a.) Type of failure, i.e. overtopping, erosion, piping, etc.: Erosion or piping
    b.) Probability of occurrence: Low, <0.01%
    c.) Estimated downstream consequence: Unknown.

13. Would a failure of the structure at flood frequency discharge less than the recommended spillway design flood Lowly increase the downstream hazard for loss of life and the economic loss?

14. Will structural failure at maximum controlled pool elevation (top of dam) cause a downstream flood wave that could result in higher hazard conditions?
    NO.

15. Will structural failure at normal controlled pool elevation cause a downstream flood wave that could result in a higher hazard classification?
    NO.

16. Is further detailed hydrologic or hydraulic study warranted? If so, explain why.
    NO.
17. Will routing the recommended spillway design flood through to pool lower (by more than 10%) attenuate the peak?
   \( \checkmark \) Yes  \( \_ \) No

18. Does the stilling basin adequately dissipate energy over expected range of discharges?
   YES, AT PRINCIPAL SPILLWAY. UNKNOWN FOR AUXILIARY SPILLWAY. DESIGN CALCULATIONS FOR AUXILIARY SPILLWAY WERE NOT REVIEWED AT TIME OF INSPECTION. NO EROSION OF PLUNGE POOL AREA SINCE 1999 REPAIR.
APPENDIX D: ENGINEERING DATA

We have estimated the flood frequency discharges requested in your email of August 28, 2015 (Process No. 20150424), as follows:

Wolf Creek at Loch Erin Dam, Dam ID 441, Section 25, T5S, R2E, Cambridge Township, Lenawee County, has a total drainage area of 18.4 square miles and a contributing drainage area of 17.8 square miles. The design discharge for this dam is the 0.5% chance (200-year) flood. The 1%, 0.5%, and 0.2% chance peak outflows are estimated to be 60 cubic feet per second (cfs), 70 cfs, and 75 cfs, respectively. (Watershed Basin No. 29 Raisin).

Please include a copy of this letter with your inspection report or any subsequent application for permit. These estimates should be confirmed by our office if an application is not submitted within one year. If you have any questions concerning the discharge estimates, please contact Mr. Susan Greiner, Hydrologic Studies and Dam Safety Unit, at 617 284 6670, or by email at: GreinerS@michigan.gov. If you have any questions concerning the hydraulics or the requirements for the dam safety inspection report, please contact Mr. Luke Trumble of our Dam Safety Program at 517-420-6923, or by email at: TrumbleL@michigan.gov.

-----Original Message-----
From: cencib@engdot.com [mailto:cencib@engdot.com]
Sent: Friday, August 28, 2015 5:33 PM
To: deq-wrd-qreq
Subject: flood or low flow discharge request (ContentID - 168812)

Requestor: Brian J. Cenci
Company: Eng., Inc.
Address: 4063 Grand Oak Drive
City: Lansing, MI
Zip: 48911
Phone: 5178871100
Date: 8/28/15
F1percent: Yes
F0.5percent: Yes
F0.2percent: Yes
ContactAgency: None Selected
ContactPerson:
Watercourse: Loch Erin Dam - Wolf Creek
LocalName: Wolf Creek
CountyLocation: Lenawee
CityorTownship: Cambridge
Section: 25
Town: 5S
Range: 2E
Location: The Loch Erin Dam is located in the south half of Section 25, Town 5 South, Range 2 East, Cambridge Township, and southwest quarter of Section 30, Town 5 South, Range 3 East, Franklin Township, of Lenawee County, Michigan
FFR1: Dam