Dam Safety Inspection Report

Upper Lake Miramichi Dam

Dam I.D. 0447

Section 33, T17N, R08W, Osceola County

Prepared for Owner/Operator:

Lake Miramichi Property Owners Association

2406 Miramichi Drive

Evart, Michigan 49631

December 10, 2023

P&N 2230855

Prein&Newhof

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Section 33, T17N, R08W, Osceola County

PREPARED FOR OWNER/OPERATOR:	Lake Miramichi Property Owners Association (LMPOA)
HAZARD POTENTIAL CLASSIFICATION:	Low
INSPECTION DATE:	October 31, 2023
REPORT DATE:	December 10, 2023
DAM'S CONDITION:	Satisfactory

INSPECTED AND PREPARED BY:

Eric E. Seguin, PE
Michigan License No. 6201055666
Prein&Newhof
100 E. Chapin Street, Suite A
Cadillac, MI 49601
231-468-3456

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1 INTRODUCTION

The purpose of this inspection report is to evaluate the structural condition and hydraulic capacity of this dam as required by Part 315, Dam Safety, and Part 307, Inland Lake Levels, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This report is limited to a discussion of observations based on a visual investigation and review of any previous reports, plans, and data that are available. This report should not be considered an in-depth engineering investigation.

This dam was inspected by Eric Seguin, P.E. of Prein&Newhof, in accordance with Section 315.18 (4) of Part 315 in response to a request from the owner of the dam. All references to "right" and "left" in this report are based on the observer facing downstream.

2 CONCLUSIONS AND RECOMMENDATIONS

The Upper Lake Miramichi Dam is in overall satisfactory condition. There are no imminent structural or hydraulic deficiencies that could lead to failure of the dam. The following recommended actions are listed by priority.

1. Clear the downstream weep holes that allow seepage water to flow through the dam. These hole locations should be marked when cleared and monitored monthly. The water flowing out of the weep holes should always be clear. If not, it should be evaluated by an engineer.

2. Seal the concrete surface cracks on the downstream embankment with a non-shrink grout.

3. Monitor the inlet access to the overflow spillway monthly, and maintain it in clear condition at all times. Installation of a trash rack on the upstream side of the inlet access is recommended.

4. The asphalt surface of the road on the dam acts as a weir and factors into the dam's capacity. Therefore, the cracks in the asphalt surface over the crest of the dam should also be sealed as a preventative maintenance task. It is recommended that this work be done annually.

5. Remove all vegetation debris from the downstream embankment annually and check for additional cracks that need to be repaired.

6. Consider installing a staff gauge on the upstream side to identify the current water level.

7. Plan for construction of a facility that will allow road users to pass this crossing during high water events. We recommend consulting with an engineer to develop a plan and budget for this work.

It is recommended LMPOA develop an Emergency Action Plan (EAP) for this dam. Having an EAP in place will allow you to identify conditions that could lead to dam failure and pre-plan coordination of necessary actions by the LMPOA in the event of a potential failure.

3 PROJECT INFORMATION

3.1 Description of Dam, Outlet, Spillway and Other Principal Features

The Upper Lake Miramichi Dam is located on Stone Creek in the southwest quarter of section 33, T17N, R8W, in Evart Township, Osceola County, Michigan. The dam is owned, operated, and maintained by the Lake Miramichi Property Owners Association (LMPOA) . The location map of the dam is shown in the Appendix A.

The dam is an earthen embankment structure and is approximately 155 feet in length. The top of the embankment is sloped and shaped to provide an overflow spillway and is armored with concrete. The top of the embankment is an asphalt paved roadway. Crest width is 30.5 feet. The upstream and downstream embankment slopes are approximately 1V:4H. A 40-foot long section of the crest at the center of the embankment is level and comprises the normal crest elevation for the spillway. A 5-foot wide, concrete, low flow channel was constructed at the center of the spillway and dam. The dam height is approximately 13 feet.

The spillway is integrated into the embankment. Structural sheet metal bridges the low flow spillway to allow vehicle traffic to pass over top. Concrete slab thickness is said to be 6 inches, however no as-built plans of the structure are available. Voids that were previously identified beneath the concrete slab were grouted in 1994.

Weep holes in the downstream side of the concrete slab provide for relief of hydraulic pressure beneath the slab. These weep holes were searched for, but could not be found. It is recommended that the downstream embankment be cleared and these weep holes be cleaned and marked for future use.

The dam was designed in 1967 by Underwood Engineering Company of Somerset, Ohio. Construction occurred during 1968. Design drawings to obtain the construction permit are on file with the MDEGLE. In 1994 voids beneath the concrete spillway slab were grouted. Maintenance and operating data are kept on file at the LMPOA offices.

3.2 Purpose of the Dam

The dam impounds a 21-acre reservoir which is used for recreational purposes by the Upper Lake Miramichi residents. The spillway discharges water into Lower Lake Miramichi.

3.3 Summary of Available Background Information

Limited information is available in files located in the Michigan Department of Environment, Great Lakes, and Energy (MDEGLE), Water Resources Division, Hydrologic Studies and Dam Safety Unit. Other information is available at the LMPOA Office.

Several inspection reports are available for inspections made since inception of the Dam Safety Program. No operating history is available for this dam.

3.4 Reference to Past Inspections

This dam was inspected in the the following years:

2018 OHM Advisors
2013 Gary Croskey, P.E.
2008 Cliff Youngs, P.E>
2003 Gary Croskey, P.E.
1998 Arthur J. Krueger, P.E.
1993 Gary Croskey, P.E.
1968 Michigan Department of Conservation

4 SITE INVESTIGATION

4.1 Embankment Observations

The embankments are in good condition overall. The embankment consists of an earthen embankment with an asphalt road at the crest, which acts as the dam's primary spillway. The downstream slope of the embankment is paved with concrete to direct flow from the spillway to the outlet.

Previous reports note weep holes constructed in the concrete in the downstream side of the embankment. It is recommended that the concrete on the downstream embankment be cleared to identify, clear, and mark the location of the weep holes. The weep holes should be cleared and monitored monthly.

There was evidence of minor seepage through cracks in the concrete at the time of the inspection. The current seepage is not of concern because it is typical of what has been noted in the past and no movement of embankment soil was noted in association with the seepage. This seepage may be due to the weep holes being plugged. Cracks over ½" in width should be sealed with a non-shrink grout to prevent uncontrolled seepage.

Trees and brush were noted on the downstream embankment in previous dam inspection reports. These items have been removed per recommendations in the previous reports. There is some small brush that is growing on both the east and west embankments. This should be removed annually.

The upstream embankment is protected with field stone rip-rap, and it is in good condition with no evidence of wave damage or erosion.

4.2 Spillway Observations

The spillway is an uncontrolled notched weir cast into the concrete and asphalt on the crest of the embankment.

There is an approximately 5’ wide x 2’ deep rectangular notch in the spillway that acts as the primary spillway for low flows. This channel is spanned by a ¾” steel plate so vehicular traffic can drive over it.

Higher flows are handled by the main weir which is also acts as a road over this dam. The asphalt surface of the weir should be sealed annually to prevent water from seeping into the dam from the crest.

5 STRUCTURAL STABILITY

There were no visible indications of any significant structural stability problems. Without knowing the full geotechnical background information for the construction materials and the actual construction practices, an in depth structural stability evaluation is beyond the scope of this inspection.

The downstream spillway slab has several cracks. None of the cracks appeared to be recent. The cracks may have developed because of the voids which were grouted in 1994. The cracks appear to be slightly larger than they were in previous reports. The cracks should be sealed using a non-shrink grout and monitored. If any change is noted, then a more detailed investigation will be required.

Cracks in the asphalt on the roadway occupying the crest of the embankment should be continually monitored for any change. If any change is noted, then a more detailed investigation will be required.

6 HYDRAULICS AND HYDROLOGY

Flood discharge values for the Upper Lake Miramichi Dam were provided by the Hydrologic Studies and Dam Safety Unit of the Land and Water Management Division of the MDEGLE. See the Appendix for a copy of the information from MDEGLE as well as the calculated structure flow rating curve.

Tributary to Big Stone Creek at Lake Miramichi Dam (Upper), Dam ID 447, Section 33, T17N, R8W, Evart Township, Osceola County, has a drainage area of 1.2 square miles. The design discharge for this dam is the 1% chance (100- year) flood. The 10%, 2%, 1%, 0.5%, and 0.2% chance peak flows are estimated to be 130 cubic feet per second (cfs), 290 cfs, 370 cfs, 480 cfs, and 650 cfs, respectively. The 1% chance flood volume is estimated to be 160 acre-feet. (Watershed Basin No. 22 Muskegon).

The dam is rated as a low hazard dam, which must safely pass the 1% chance peak flood flow, (100 year flood). The MDEGLE has identified the 1% chance design discharge for this dam to be 370 cubic feet per second, (cfs).

Hydraulic calculations were completed during the 1993 inspection report to identify the capacity for the spillway structure. Those calculations were reviewed and validated, (see the calculations and capacity curve in the Appendix D). With the structures armored embankments acting as an overflow spillway, the structure has the capacity to pass the peak flood flow of 370 cfs., with approximately 3.5 feet of freeboard. The design flood flow, (370 cfs), will cause the impoundment to rise to an elevation of approximately 1075.9 feet. This elevation is based on the assumed benchmark for the top of the embankment of 1074.0 feet.

7 OPERATION AND MAINTENANCE

In the past, there has not been a formal operation and maintenance program developed for the Dam. It is a good idea that all dam structures have a formal Operations and Maintenance Manual.

The dam is owned/operated by the Lake Miramichi Property Owners Association. General maintenance should consist of mowing the grasses and weeds on the embankments and removing any brush, seedlings or trees that may grow. The mowing of the grasses and weeds will allow for easier visual inspection of the entire structure. The general visual inspection of the embankments, structure, and appurtenances should be performed on a semi-annual basis. It is recommended that an operation and maintenance log be kept so that any changes can be easier identified over time. A written record should be kept of inspections made by owners, including, a log book of pictures of the structure and records of maintenance items performed.

Appendix A

Location Map



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Prein&Newhof

Appendix B

EGLE Discharge Correspondence

Eric Seguin

From: EGLE-wrd-qreq <EGLE-wrd-qreq@michigan.gov>
Sent: Tuesday, November 28, 2023 9:52 AM
To: Eric Seguin
Subject: [External] RE: Flood or Low Flow Discharge Request

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Caution: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. When in doubt, contact your IT Department.

We have processed the discharge request submitted by email on October 30, 2023 (Process No. 20230570), as follows:

Tributary to Big Stone Creek at Lake Miramichi Dam (Upper), Dam ID 447, Section 33, T17N, R8W, Evart Township, Osceola County, has a drainage area of 1.15 square miles. The design discharge for this dam is the 1% chance (100-year) flood. The 10%, 2%, 1%, 0.5%, and 0.2% chance peak flows are estimated to be 130 cubic feet per second (cfs), 290 cfs, 370 cfs, 480 cfs, and 650 cfs, respectively. The 1% chance flood volume is estimated to be 160 acre-feet. (Watershed Basin No. 22 Muskegon).

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 Ms. Susan Greiner, Hydrologic Studies and Floodplain Management Unit, at 517-927-3838, 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. Michael Size of our Dam Safety Unit at 989-619-4295, or by email at: SizeM@michigan.gov.

From: EGLE-Automated <EGLE-Automated@michigan.gov>
Sent: Monday, October 30, 2023 8:18 AM
To: EGLE-wrd-qreq <EGLE-wrd-qreq@michigan.gov>
Subject: Flood or Low Flow Discharge Request

Requestor: Eric Seguin
Company: Prein&Newhof
Address: 100 E Chapin Street, Suite A
City/State: MI
ZIP Code: 49601
Phone: 2314683456
Date: 10/30/2023
10 percent
2 percent
1 percent
0.5 percent
0.2 percent
Contact Agency:

Contact Person:
Watercourse: Tributary to Big Stone Creek
Local Name:
County: Osceola
City/Township: Evart Township
Section: 33
Town: 17N
Range: 08W
Location: Upper Lake Miramichi Dam. Dam ID #447, USGS Quad Chippewa Lake North Dam is located on Miramichi Rd.
Lat: 43.81598013, Long -85.27352524 Previous Flow Request for this location is File #20180412, Reference #H-98324-2
FFR1: Dam
Email: eseguin@preinnewhof.com

Appendix C

Sketches



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6HFWLRQ 7^1 5 : 2VFHRO
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Prein&Newhof

Appendix D

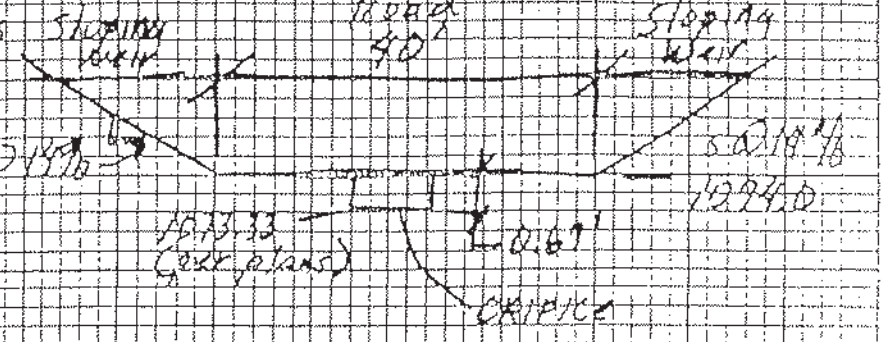
Hydraulic Computations

Lake Miramichi Upper Dam #947

GFC 5/93 1 of 2

GARY F. CROSKEY, P.E.
DAM SAFETY CONSULTANT
336 University Drive
East Lansing, MI 48823-4133
Telex: 517-332-7019

Hydraulic Computations



(1) Road use Weir eqn $Q = C_L b H^{3/2} = 2.8(40) H^{3/2} = 112 (H)^{3/2}$

(2) Trickle Channel Weir eqn with elev. 1074 then orifice

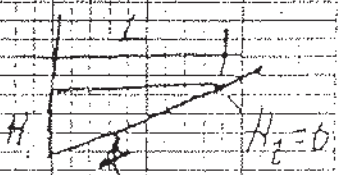
@ 1074.0 $Q = 2.8(5)(0.67)^{3/2} = 8$ cfs

Above 1074.0 Orifice $\Rightarrow Q = C_d A \sqrt{2gH} = 0.60(1.0)(5)\sqrt{2gH}$

$= 2\sqrt{2gH}$ where $H = (\text{Elev} - 1074) + \frac{1}{3}(0.67)$

$= (\text{Elev} - 1074) + 0.33$

(3) Stepping Weirs 2 sides $Q = C L (H_{mid})^{3/2}$



where $L = H / 0.14$

$Q = 2\left(2.8\left(\frac{H}{0.14}\right)\left(\frac{H}{2}\right)^{3/2}\right) = 40\,H\left(\frac{H}{2}\right)^{3/2}$

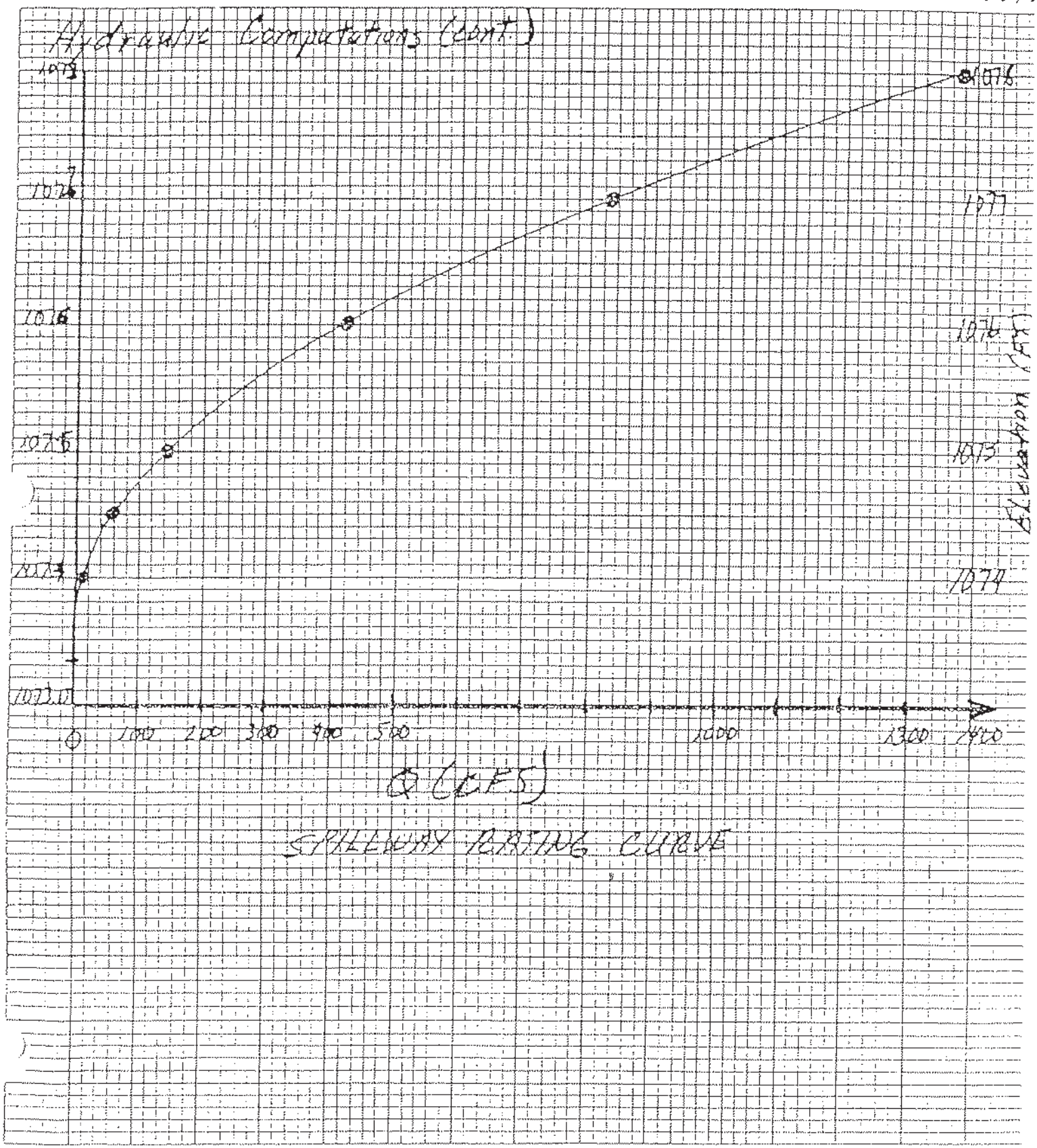
Elev	Trickle H	Trickle Q	Road ΔH	Road Q	Stepped Weir H	Stepped Weir Q	Q TOTAL
1073.0	—	0	—	—	—	—	0
1074.0	0.67	8	—	—	—	—	8
1074.5	1.0	16	0.5	40	0.5	2.5	58
1075.0	1.33	18	1.0	112	1	14	144
1076.0	2.33	29	2.0	316	2	80	420
1077.0	3.33	29	3.0	582	3	220	831
1078.0	4.33	33	4.0	896	4	452	1381

Lake Miramichi Upper Dam #447

GARY F. CROSKEY, P.E.
DAM SAFETY CONSULTANT
336 University Drive
East Lansing, MI 48823-4133
Telex: 517-332-7019

GFC
5/93
2 of

Hydraulic Computations (cont.)



Appendix E

Photographs Taken 10/31/2023



Figure 1: Water Exiting From Cracks in Downstream Embankment Concrete



Figure 2: Crest and Downstream Embankment Looking Left



Figure 3: Spillway and Downstream Embankment



Figure 4: Spillway and Steel Plate (Road Crossing) over central weir - Downsream Side



Figure 5: Downstream embankment from crest looking downstream



Figure 6 Center Channel in weir with road plates (mostly) removed)



Figure 7: Crest Looking Left



Figure 8: Downstream Embankment



Figure 9: Crest Looking Left, Near Downstream Embankment



Figure 10: Crest Looking Right



Figure 11: Downstream Embankment looking towards crest



Figure 12: Upstream embankment looking left