DAM SAFETY INSPECTION REPORT

CORUNNA DAM
DAM ID 379

SHIAWASSEE RIVER
SHIAWASSEE COUNTY
SE ¼, Section 21, T7N, R03E

OWNER/OPERATOR: City of Corunna
402 North Shiawassee Street
Corunna, Michigan 48817

HAZARD POTENTIAL CLASSIFICATION: Significant

INSPECTION DATES: August 28, 2009

REPORT DATE: October 12, 2009

PREPARED AND INSPECTED BY:

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STATE OF MICHIGAN
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INTRODUCTION

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

All references to "right" and "left" in this report are based on the observer facing downstream.

CONCLUSIONS AND RECOMMENDATIONS

The Corunna Dam is in poor condition. However, the dam is in such poor repair that it could be classified as a failure in progress. The entire structure is submerged during the design flood. The following recommended actions are listed by priority.

1. Continue planning for repair, replacement, or removal of the dam.

2. Continue to monitor the leaks and boils under the stop log spillway on a regular basis until the final disposition of the dam is determined.

3. Remove vegetation from stop logs and spillway walls as soon as practical.

4. An emergency action plan (EAP) has been prepared by the owner and has been provided to the Dam Safety Program. This plan should be reviewed to determine if the plan is up to date. The owner shall advise the Dam Safety Program of the findings of this review and submit any revisions to the Dam Safety Program and to the county emergency management coordinator by December 31, 2009.

5. Develop a written operations and maintenance (O&M) plan by December 31, 2009, and provide a copy to the Dam Safety Program.

The significant hazard potential rating for this dam remains appropriate.

PROJECT INFORMATION

The Corunna Dam was originally constructed in the mid-1800's to provide power for a mill. The dam is currently owned by the City of Corunna (City). The dam currently provides recreational opportunities and enhances the aesthetics of a nearby local park. The dam consists of a 200-foot long concrete capped timber crib dam (overflow section), with a stop log control section approximately 25 feet wide. The dam has a structural and hydraulic height of 10 feet, creating an impoundment with an estimated surface area of approximately 17 acres. The structure maintains approximately 7 feet

of head during normal summer flow conditions. There are essentially no embankments at this dam.

Repairs were made in 2006 to reinforce the concrete wall section of the stop log control structure. This work was authorized under Department of Environmental Quality Permit Number 06-78-0022.

The City does have a dam committee that oversees issues concerning the dam. The City also has a small annual maintenance fund to cover minor repairs and maintenance at the dam. They have attempted to obtain funding for repairs or modifications to the dam but have been unsuccessful. Based on discussion with the City Manager, the City simply does not have the resources or capability to institute a major construction project at the dam at this time.

A 2005 dam safety inspection report prepared by the Spicer Group was used as a reference for this inspection and report.

SITE INVESTIGATION

The following discussion of the physical condition of the dam and appurtenances is based on observations and photographs obtained on the dates of the inspection.

Overall, the Corunna Dam is in poor condition. An overview of the dam is shown in Photograph 1. The overflow section of the dam is shown in Photographs 2 through 4. Although the concrete section was not visible due to the water flow, it is apparent from the discontinuous nature of the flow over the crest that the concrete is deteriorating and rough. This is also evident from previous inspection reports and photographs. These conditions are typical of timber cribbed dams that have been capped with concrete. The timbers continue to deteriorate and disintegrate, and the concrete cap settles, cracks, and displaces, leading to the conditions observed today. These conditions also lead to leakage into the cribbed portions of the dam, allowing water to flow through the structure. This in turn leads to further continued degradation of the structure. This process is continuous and insidious, and eventually leads to a failure of a portion of the overflow structure, as it did in nearby Chesaning a few years ago.

The stop log spillway section is shown in Photograph 5. It consists of the two stop log bays, a center dividing wall, a left training wall (which divides the overflow section from the stop log spillway), and the right retaining wall. The individual stop log bays are shown in Photographs 6 and 7. The stop logs in both bays are leaking and have vegetation growing between the individual logs. The concrete surfaces of all walls are severely deteriorated, as shown in Photographs 9 and 10. In addition, vegetation has taken root in some areas. All of this vegetation should be removed as soon as practical.

Steel supports have been installed through the outlet channel of the stop log spillway, as shown in Photographs 6 and 7. These were constructed to support the concrete walls, which were probably beginning to tip.

The stop log spillway channel leads to a concrete slab, which was apparently the base of the mill structure. Two large circular holes exist in the slab, which were probably the exit route of the draft tubes for the turbines or power wheels in the mill. This slab is shown in Photograph 12 through 14. All of the concrete is in poor condition, with blocks missing or eroded and exposed reinforcing steel.

Photographs 15 through 18 show the floor slab in the stop log spillway channel. Flow leaks through the base of the wall and through the floor in a number of locations. This is evidence that the wall is in poor condition and that the soil behind the wall has eroded, weakening support for the spillway wall. This explains why the steel supports were installed. Further evidence of this erosion is shown in Photographs 19 and 20, where concrete has been placed to fill voids in the earth adjacent to the spillway wall and where a void is once again evident.

STRUCTURAL STABILITY

Based on the conditions described above, the dam is in a state of progressive failure. How or when it will fail is unknown. What is known is that without significant attention, the dam will eventually fail. Planning should begin immediately to determine whether to repair, replace, or remove the structure.

HYDROLOGY AND HYDRAULICS

The contributing drainage area to the Shiawassee River at the dam is approximately 508 square miles. The design discharge for this dam is the ½ percent chance (200-year) flood discharge of 6,800 cubic feet per second (cfs). This discharge will result in approximately 5 feet of flow over the spillway.

OPERATION AND MAINTENANCE

A written O&M plan, outlining procedures for upkeep and operation of the dam, should be prepared for this dam by December 1, 2009. This plan should be periodically reviewed and updated to reflect changes in operation and maintenance procedures.

EMERGENCY ACTION PLAN

Since the Corunna Dam is a significant hazard potential dam, an emergency action plan is required. An EAP has been prepared by the owner and has been provided to the Dam Safety Program. This plan should be reviewed to determine if the plan is up to

date. The owner shall advise the Dam Safety Program of the findings of this review and submit any revisions to the Dam Safety Program and to the county emergency management coordinator by December 31, 2009.

APPENDICES

A location map and inspection photographs are attached.

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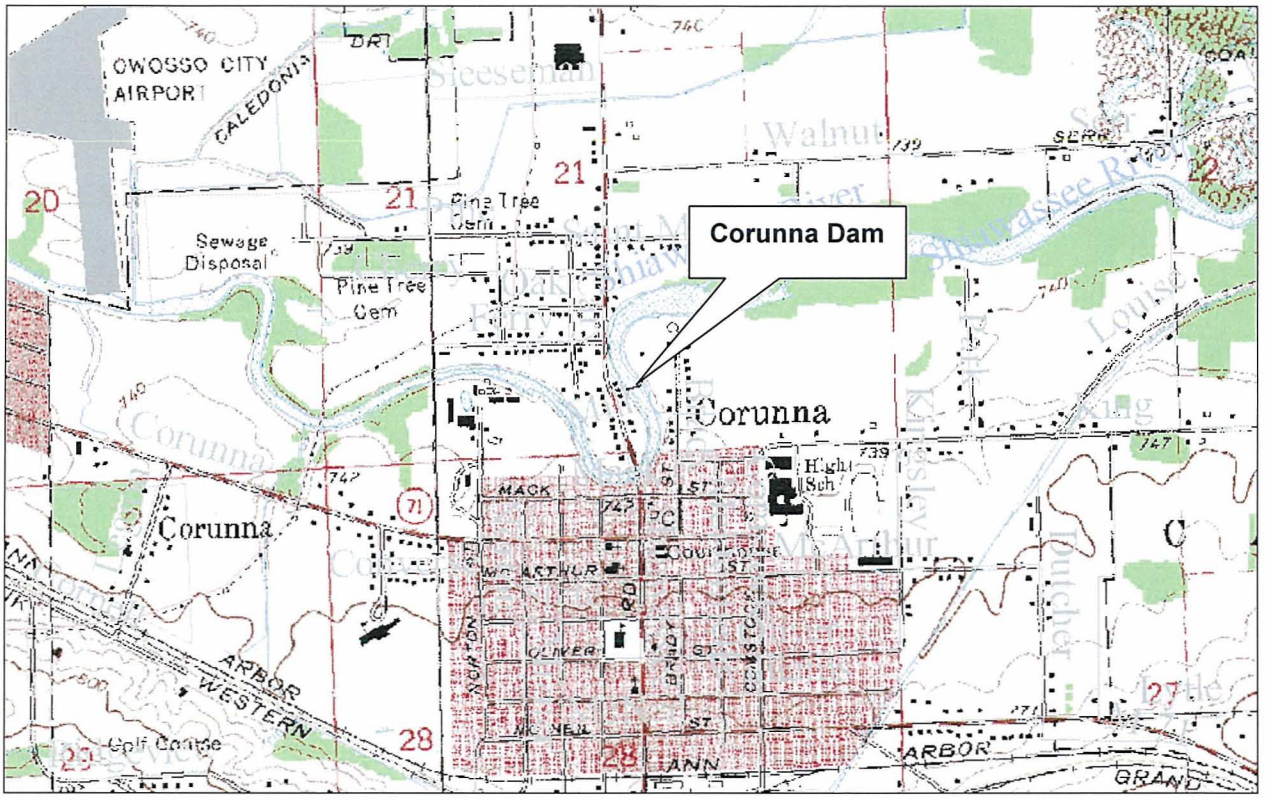

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Photograph 1 – Dam viewed from downstream

Photograph 2 – Left portion of overflow section

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Photograph 3 – Center portion of overflow section

Photograph 4 – Right portion of overflow section

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Photograph 5 – Stop log spillway section

Photograph 6 – Right stop log section

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Photograph 7 – Left stop log section

Photograph 8 – Overflow section viewed from training wall

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Photograph 9 – Training wall between spillway sections

Photograph 10 – Training wall between spillway sections

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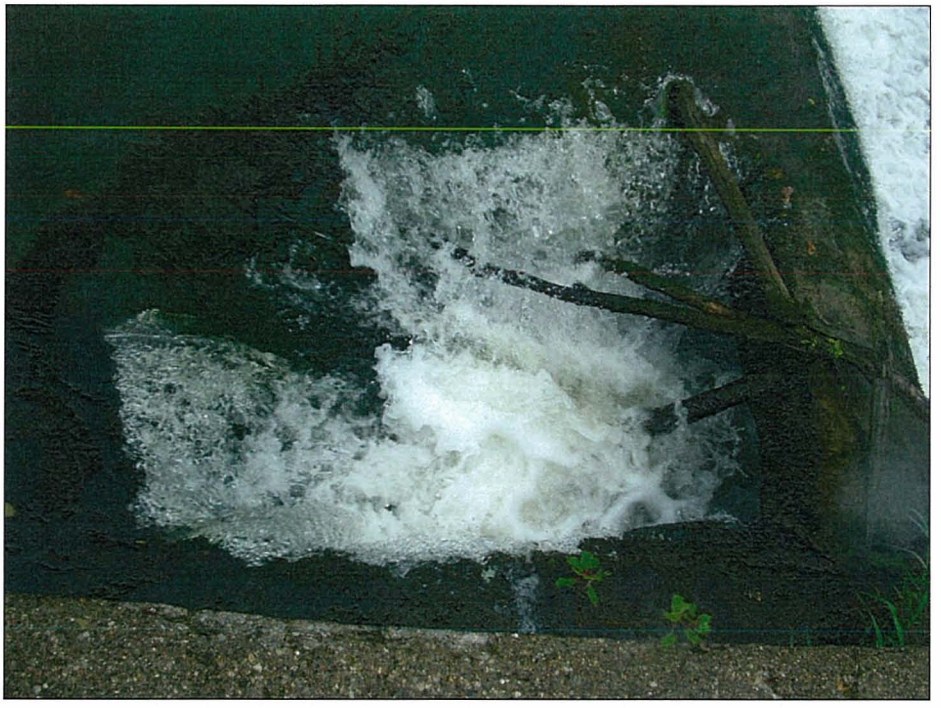
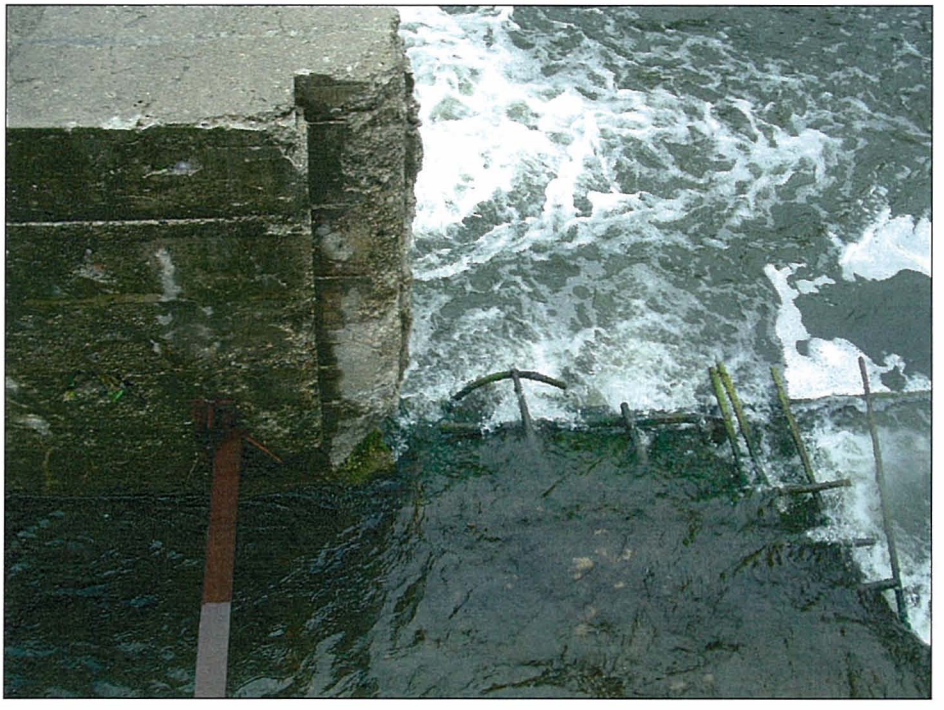


Photograph 11 – Chute in overflow section adjacent to training wall



Photograph 12 – Downstream end of training wall and slab

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Photograph 13 – Downstream slab

Photograph 14 – Downstream slab

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Photograph 15 – Leaks at base of right wall

Photograph 16 – Leaks at base of right wall

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Photograph 17 – Leaks at base of right wall

Photograph 18 – Boils in downstream slab

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Photograph 19 – Repairs and hole adjacent to right wall

Photograph 20 – Settlement adjacent to right wall