Flook Dam #8 Structural Inspection Report

Washtenaw County, Michigan
Located on Huron River

Prepared for:

Scott Miller, P.E., Deputy Washtenaw County Water Resources Commissioner
Washtenaw County
millers@washtenaw.org

Prepared By:

Spicer Group, Inc.
230 S. Washington
Saginaw, Michigan 48605-1689
(989) 754-4717

Inspected By:

Daniel Zeddies

Daniel P. Zeddies, P.E. # 67919

Date of Inspection: June 20, 2023
Date of Final Report: July 6, 2023

Project I.D. Number 134700SG2023

INTRODUCTION

The Flook Dam #8 was inspected following based on recommendations from previous inspection and following the failure of the radial gate in Bay 5W. Spicer Group conducted the inspection of the dam on June 20th, 2023, as requested by the delegated authority of the dam, the Washtenaw County Water Resources Commission. The scope of this inspection is to perform a visual structural evaluation of the steel radial gates including the steel skin plate, support beams, trunnion pins, concrete retaining walls, intermediate piers and spillways in all 5 bays. Following the inspection, the scope included giving recommendations for any immediate repairs necessary and creating a plan for future maintenance of the structures.

The Flook Dam #8 structure was constructed in 1964 to control the level of the Huron River. The dam consists of five 20-foot-wide spillways with steel radial gates. The structure consists of concrete retaining walls on either side of the spillways with intermediate concrete piers. There also is a concrete apron on the downstream side of the spillway with energy dissipaters with a riprap stilling basin.

Flow is controlled by the radial gates connected to electric hoists. Prior to the inspection, the gate in Bay 5W was being exercised and a steel arm on the radial gate failed, buckling into the trunnion pin and getting caught on the pin on a skew. The gate is ineffective and stop logs are in place in Bay 5W to control the flow.

This inspection report will serve as a supplement to previous inspections performed on the dam. Previous inspection reports, drawings, sketches, etc. will be referred to as part of this inspection report.

FIELD CONDITIONS

Spicer Group performed a visual inspection of the dam on June 20th. The photographs taken in the field are included in the Appendix of this report. The in-field inspection was very limited due to the inability to install stop logs in any of the bays to reduce flow through the structure. All of the visual inspection was completed from the walkway above the structure and above the retaining walls on either side of the structure. The following summary is based on these limited visual observations.

Inspection Summary

As noted above, the gate in Bay 5W was being exercised and a steel arm on the radial gate failed, buckling into the trunnion pin and getting caught on the pin on a skew. The failure of the gate is likely due to severe corrosion and section loss of the arm angles connecting the trunnion pin to the gate face and the inability for the gate pin to rotate as required to lift the gate, causing excess strain on the gate arms. The radial gate is currently ineffective and stop logs are in place in Bay 5W to control the flow.

The radial gates in Bays 1W through 4W appear to be in a similar condition to the gate in Bay 5W, prior to failure. The arm angles have severe corrosion and section loss up to at least 50% of the design thickness. There was an attempt to lift the gate in Bay 4W but it was unsuccessful, likely due to the similar state of the trunnion pin being unable to rotate in the bushing in the pier wall. These gates are in severe condition.

The concrete of the intermediate piers and retaining walls typically have some minor local spalling, some map cracking and minor efflorescence showing through the cracks. These defects are relatively minor and only cosmetic.

There is a large vertical crack on the West retaining wall that is about ½" wide where the concrete walls is separating. There is a crack gauge installed to track the movement and it does appear that the crack is still moving a few millimeters every few years. This crack is located at the end of the downstream apron of the dam and likely due to the retaining wall South of the apron being under designed.

RECOMMENDATIONS

Overall Condition/Recommendations

1. **Replace all (5) radial gates.** Visual inspection of the dam spillway structures indicates the radial gates are severely deteriorated and in severe condition and require replacement as soon as possible.

2. **Repair vertical crack in West retaining wall.** The large vertical crack in the West retaining wall is also in poor condition due to the continued movement of the wall and should be repaired.

3. **Apply waterproofing membrane to concrete surfaces**. The concrete portions of the structure only have minor spalling, cracking and efflorescence. The spalled portions of the concrete should be patched, and the concrete should be cleaned and sealed with a waterproofing membrane.

The replacement of the radial gates is necessary as soon as possible due to the failure of the gate in Bay 5W. A cost estimate for replacements of all of the radial gates, installing a new hoist and winch system, repairing the retaining wall and applying waterproofing to the concrete surfaces is attached. The total cost estimate includes an estimate for construction, mobilization and a 20% contingency is included. The preliminary cost estimate is a total of $652,600.

PRELIMINARY ESTIMATE OF COST

FLOOK DAM #8 REHABILITATION
WASHTENAW COUNTY
WASHTENAW COUNTY, MICHIGAN

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
1.	1	Lump Sum	Remove Tainter Gates	$100,000.00	$100,000.00
2.	15,000	Lb	Replace (5) Tainter Gates	$15.00	$225,000.00
3.	1	Lump Sum	Construct Cofferdam/Install New Stoplogs and Dewater	$50,000.00	$50,000.00
4.	1	Lump Sum	West Retaining Wall Excavate, Tie Backs and Waterproofing	$30,000.00	$30,000.00
5.	400	Syd	Clean and Apply Waterproofing to Concrete Surfaces	$30.00	$12,000.00
6.	5	Ea	Install New Hoist and Winch System	$15,000.00	$75,000.00
7.	20	Cft	Concrete Handchipping & Patching	$500.00	$10,000.00

Sub-Total - Construction Cost	**$502,000.00**
Mobilization/Clean Up	$50,200.00
Contingencies (20% +/-)	$100,400.00
TOTAL PRELIMINARY ESTIMATE OF COST	**$652,600.00**

APPENDIX A

2023 - PHOTOGRAPHS

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