VERMONT

Vermont Department of Environmental Conservation *Agency of Natural Resources*
Water Investment Division
Dam Safety Program
1 National Life Drive, Davis 3
Montpelier, VT 05620
Phone: 802-622-4093

MEMORANDUM

TO:	Town of Glover – Dam Owner Theresa Perron, Town Administrator
FROM:	Benjamin Green, PE, Vermont Dam Safety Program (DSP) – Dam Safety Engineer Steven Hanna, DSP – Dam Safety Engineer
DATE:	September 17, 2024
SUBJECT:	Site Visit Report Shadow Lake Dam (State ID No. 81.02), Glover, Vermont SIGNIFICANT Hazard Potential

On September 7, 2024, the Dam Safety Program performed a site visit to Shadow Lake Dam in response to July 26, 2024, Flood Inspection and Recommendations Report (herein referred to as the July 26, 2024, Report) to view the existing deficiencies, collect additional data, discuss stoplog operations, and discuss the current status of the dam and next steps. The following Town Representatives met us at the dam:

- Theresa Perron, Town Administrator
- Dave Simon, Selectboard
- Dwain Clevenger, Maintenance
- Jack Sumberg, 2nd Dam Monitor
- Scott Pray, Road Crew
- Rich LaClair, Road Crew

The following is a summary of the observations and discussions from the site visit:

- The DSP observed a single lane gravel access road with ditching and culverts had been constructed approximately 250 feet long from Stone Shore Road on the northern side of the discharge channel that leads to the left embankment of the dam. The Town reported that the access road was constructed to improve access to the dam for monitoring and maintenance and for other future work.
- At the time of arrival, the water level in the pond was measured to be approximately 6.3 feet below the top of concrete sill of the gatehouse (approximately the dam crest elevation which is reportedly El. 1,399.8 (NAVD88) based on survey by Dubois & King, Inc. (D&K)). Approximately 2 inches of water was observed flowing over the stoplogs. The Town reported that one 11.5-inch high wooden (dimensional lumber) stoplog had been removed last month as they endeavored to comply with the July 26, 2024, Report and its 2-foot target drawdown. Along the perimeter of lake, a zone of exposed pond bottom/land that is typically underwater could be observed. The Town reported that lakeshore owners had largely removed motorized watercraft from the lake due to the lowering water level.
- The area of the sinkhole that was temporarily repaired and overseen by D&K was observed and appeared to be firm and stable. The crushed stone backfill used to make the repair could be observed at ground surface.
- Upstream of the sinkhole location, the DSP was directed to a new, small sinkhole located on the upstream side of the granite masonry wall. The sinkhole was approximately 6 inches wide (upstream to downstream), 18 inches

long (left to right), and appeared to be over 24 inches deep and angled towards the auxiliary spillway. The DSP recommended that this small sinkhole be over-excavated and backfilled with crushed stone encased in filter fabric like the original sinkhole temporary repair.

- The area of historic seepage/leakage at the discharge area of the auxiliary spillway was inspected. Standing water was observed in this area but no active seepage was detected.
- The Town provided access to the gatehouse and the DSP made the following observations (see attached site sketch):
    - As noted in the previous report, two of the 4 inches by 4-inch vertical timbers comprising the trash rack at the spillway inlet have been removed with 7 timbers now remaining. The concrete principal spillway channel has a total width of approximately 65 inches. Based on field measurements, the cumulative opening between the vertical timbers was measured to be approximately 43.5 inches (from right to left in inches, 4.5, 13, 4.5, 4.5, 12, 5). It should be noted that based on these measurements, approximately 67% of the channel width is available for flow. It should be noted that a horizontally oriented 3 inch by 7-inch timber was noted near the normal water line spanning the channel width as well.
    - From the trash track, the stoplogs are approximately 57 inches downstream.
    - A height of approximately 53 inches of stoplogs were installed in the slots when we arrived onsite. Debris in the approach channel made obtaining an accurate measurement difficult. The slots in the concrete to support the stoplogs are 6 inches by 6 inches. The top stoplog was measured to be a 5-inch-high rough-cut timber. The next stoplog appeared to be approximately 12 inches in height. The dimensions of the lower stoplogs could not be measured in the flowing water. At this time, the 5-inch high stoplog was removed in an effort to reach the 2-foot drawdown target recommended in the July 26, 2024, Report. The stoplog was removed with normal effort. It was recommended to the Town that once flows stabilize over the stoplogs, that the next approximately 12-inch high stoplog be removed and the 5-inch stoplog (perhaps new stock) be installed to achieve the targeted 2-foot drawdown. The 12-inch appeared to well seat in position. If typical removal techniques are unsuccessful, alternative techniques were discussed such as cutting it out (taking care not to cut past that stoplog) and/or partially closing the gate to equalize water pressure (with appropriate staff safely considerations taken into account). The Town indicated they would plan to perform these operations soon. Jack Sumberg, who has been involved with the dam since 2012 indicated that the full stack of stoplogs were replaced roughly 10 years ago, which based on the overall fair condition of the removed 5-inch stoplog, appeared reasonable.
    - The face mounted metal slide gate is located approximately 37 inches downstream of the stoplogs. The gate sides appeared to be properly situated in the guide channels. The gate was test operated to nearly fully closed and back to its typically maximum opening position, which was measured to be approximately 21 inches above the invert of the 36-inch diameter concrete discharge pipe (or 15 inches protruding into the opening) downstream of gate. The gate operated smoothly through this range and did not appear to have any areas of binding. The reason for the gate not opening clear of the 36-inch pipe were investigated. The top of the rising stem did not appear to have interference and the gate itself did not appear to reach a stop point. It was surmised that perhaps the bottom end of the threaded stem is reached at its current maximum opening position and that is the reason it cannot be opened clear. While this could not be visually confirmed as it is in the internal workings of the gate, the theory appears credible. Jack Sumberg reported that the configuration of the gate has been unchanged since his involvement in dam operations in 2012.
    - The length of the 36-inch diameter pipe downstream of the gate was not field measured but appears to be on the order of 3 feet.
    - At the discharge end of the concrete pipe, the discharge channel slopes upwards over a length of approximately 5 feet and a rise of approximately 11 inches. In the center of the ramped section is a 5-inch-wide slot that appears to be graded roughly level. It was surmised that the ramp is likely a means to reduce flow energy.
    - Downstream of the ramp, flow enters a stone lined channel with dry-set stone walls on either side. Some stones near the base of the wall were missing and some undermining was noted.

- Next steps at the dam were discussed and include the following:
    - The Town is to carefully remove the 12-inch stoplog and re-insert a new 5-inch high stoplog to achieve the recommended 2-foot drawdown from the July 26, 2024, Report.
    - The Town is to continue to monitor the dam regularly, paying particular attention to the sinkhole area. The Town indicated that additional brush removal would also be performed.
    - The Town indicated that they have applied for approximately $85,000 in funding for engineering for the dam, but it is unknown when and if it will be awarded. Additional engineering assessment is needed to explore subsurface conditions of the embankment and foundation (i.e. test boring program) and perform stability and seepage analyses. The results of that study should be combined with the results of the hydrologic and hydraulic study to identify several permit-able solutions to rehabilitate the dam to bring it into compliance with current dam safety requirements including an engineer's opinion of probable costs. Those alternatives should then be presented to the public so that a preferred alternative can be selected, fundraising can be started, and design, permitting, and construction can follow.
    - It was discussed that it may take several years to secure funding and complete the permanent rehabilitation alternative at the dam, including securing funding, performing additional analyses, public outreach and decision making, design, permitting, and construction. ***It was confirmed by the DSP that until the permanent solution can be implemented, the existing reservoir restriction (i.e. 2-foot drawdown) will be required to remain in place.***
    - Funding opportunities were briefly discussed. In general, funding opportunities for dam rehabilitation are limited.
    - While not discussed at the meeting, the Town has developed an up-to-date Emergency Action Plan for the dam.

The DSP remains available to discuss this site visit, next steps, and the dam. I can be reached at 802-622-4093 or Benjamin.green@vermont.gov.

Photo 1: The dam from the auxiliary spillway looking at the gatehouse. The temporary sinkhole repair on the crest can be seen.

Photo 2: Small sinkhole upstream of the stone masonry wall near the existing sinkole.

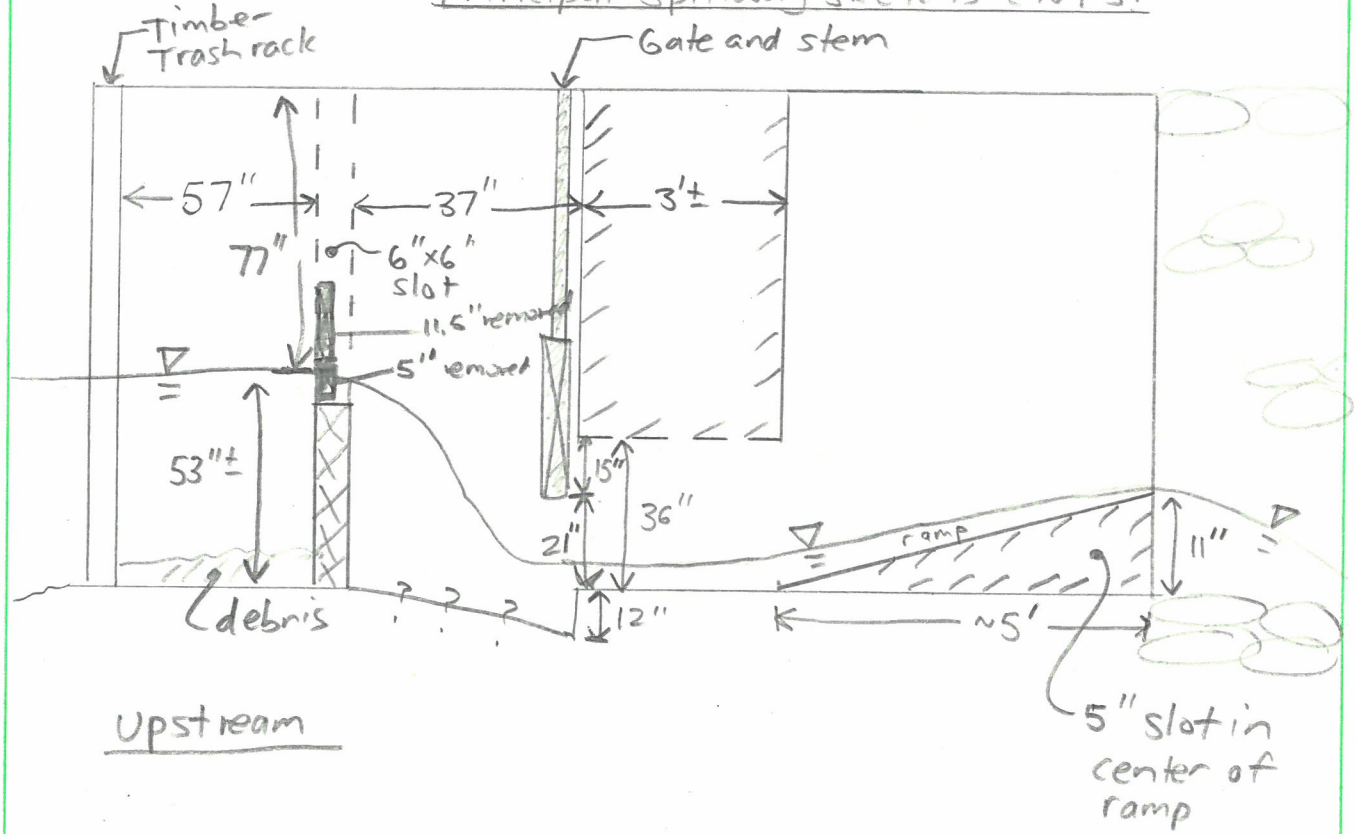
Photo 3: The gate plate exending into the 36 inch concrete pipe waterway opening. From the invert of the pipe to the bottom of the plate was measured to be approximatley 21 inches. From the bottom of the plate to the crown of the pipe was measurd to be approximatly 15 inches.

Photo 4: The gate downstremaof the stoplogs looking downstream.

Photo 5: The gate stem where it enters the floor, above.

Shadow Lake Dam | Glover, VT | 9/18/24, Ben Green VT DSP

Principal Spillway Sketchs (NTS)



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