

SILVER LAKE FLOOD MITIGATION BUILD PLAN

This document outlines a proposed build for a temporary use pumping station to manage water runoff into Silver Lake from out of the ordinary precipitation events. The project will be funded and maintained by Silver Lake Management District (upon riparian owner approval). The project will pump water through the Hwy 21 culvert out through the Lake Irogami Weir into the Bruce/Thorstead creek water shed (Refer to operational proposal). The project will not raise the Ordinary High-Water Mark (OHWM) of Lake Irogami. Lake Irogami will only serve as a conduit for excess water to the weir. The movement of natural and pumped water from Irogami out the Weir into the Bruce/Thorstead creek watershed will not exceed the 10 cubic ft/sec (CFS) permitted to the Silver Lake Sanitary District (SLSD). This build/mitigation proposal is necessary due to the fact any movement of water from Silver to Irogami lake will flow back into Silver Lake due to elevations of the State Highway 21 culvert. The Irogami side (North) of the Hwy 21 culvert is at elevation 867.61, while the Silver Lake side (South) is at elevation 867.41. Lake Irogami being 0.2 ft (2.4") higher will result in any movement of water from Silver to Irogami, flowing back into Silver Lake (Refer to Figure 1). All Waushara County local zoning and Wisconsin DNR requirements will be followed for this project.

FOR SILVER LAKE MANAGEMENT DISTRICT

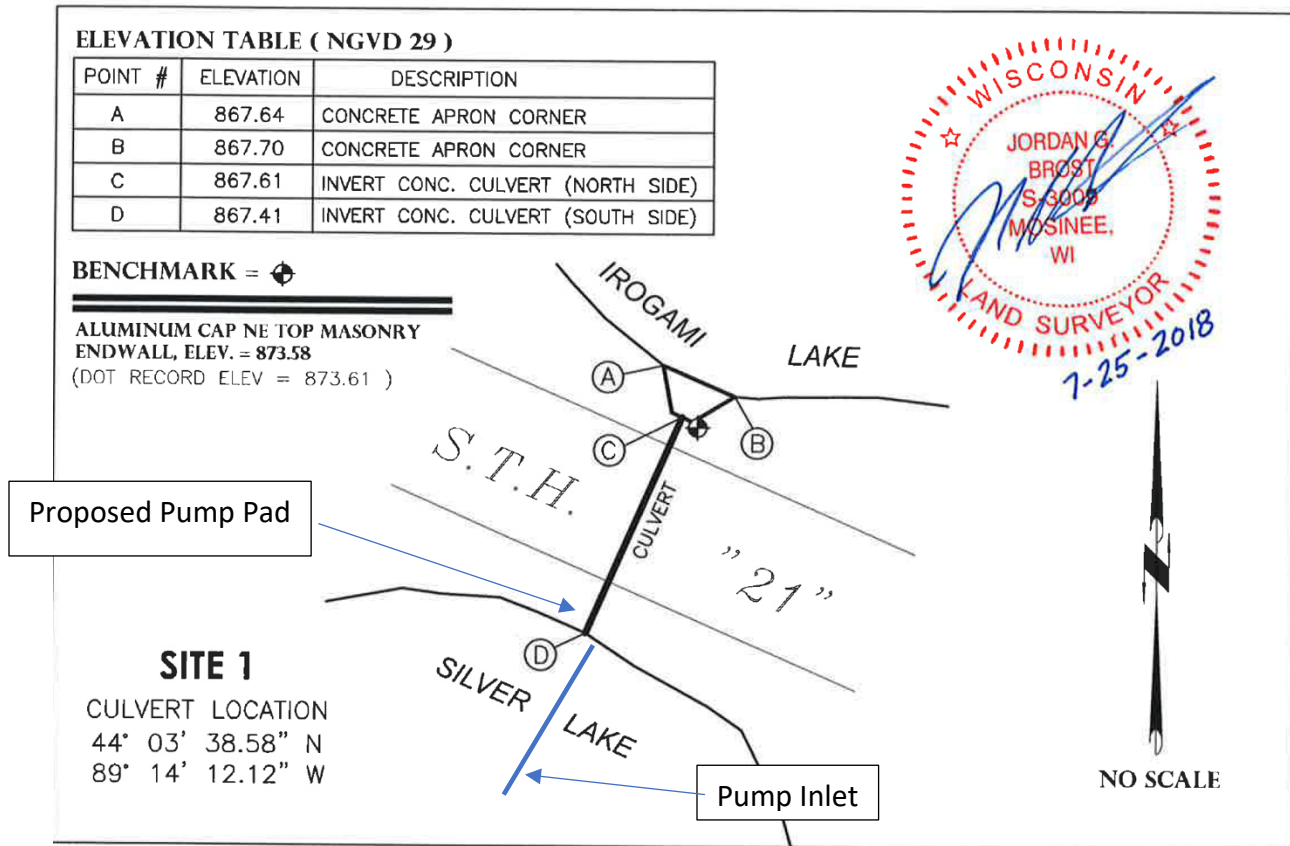


Figure 1. WI DOT State Highway 21 culvert elevations between Silver and Irogami Lakes.

- 1) Proposed pump pad (refer to Figure 1) will be built on the Silver Lake side of the Highway 21 culvert.
 - a) Placement of the pad will be on the west side of culvert by easement.

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- b) Pile Sheet piling if necessary, will be installed to allow for creation of a pump pad and water intake pipe with a top of pad elevation of 869.0 Ft (2 ft over Silver Lake OHWM of 867.0).
- 2) Alliant energy will place a pole and meter next to the pad to provide 440v electric service for an electric temporary pump.
 - a) Silver Lake Management District is the responsible agency for operation, costs, and maintenance.
 - i) It is expected there will be a nominal monthly charge to provide service, since no electricity will be used the majority of the time.
 - ii) An aesthetically pleasing small building will house an electric driven self-priming pump capable of pumping 3000 gallons/minute. The building will have a locked door preventing unauthorized tampering and use.
 - iii) Landscaping with shrubs and native wetland plants may be necessary after construction is completed.
 - b) The electric meter and disconnect will be inside the small pump building to prevent unauthorized use
- 3) An 8" PVC pump intake pipe will extend from the pad 100' into Silver Lake from the pump pad.
 - a) All Wisconsin DNR requirements will be followed.
 - b) The pipe will lay on the bottom surface of Silver Lake and be marked with restrictive buoys.
 - c) An appropriate intake screen will be attached at lake to prevent fish and aquatic life from being pulled into the pump intake.
 - d) The rise of the pipe from the lake bottom to the pad will be via a 45-degree elbow.
 - e) Termination of the pipe at the pump pad will be a threaded coupler. This allows for an 8" fire hose connection from the lake intake pipe to the pump intake.
- 4) Creation of a swing gate structure is required on the Irogami side of the culvert, since the OHWM of Irogami Lake is higher than Silver Lake. Natural water flow is from Irogami into Silver Lake. Without this gate any movement of water from Silver to Irogami will backflow into Silver Lake.
 - a) Construction of the gate would be rectangular 3"x 3" aluminum frame with vertical braces every 18 inches (Refer to Figure 2).
 - b) 4" AL plate welded to bottom of square tube frame.
 - c) A flood control bladder would be attached to the bottom of the frame to provide a seal between the gate and bottom of culvert. The gate seal will be comparable to what is used to seal roadways between flood control earthen berms to manage stormwater runoff.
 - d) Two (2) vertical poles will be installed.
 - i) On the Lake Irogami side, one pole facing the culvert will contain the hinge structure.
 - ii) The other side will have a closure mechanism which can allow the gate to be fully closed or held partially open in 1 position allowing backflow of water into Silver Lake if necessary.
 - iii) The open or closed positions can be locked in place to prevent unauthorized use.
 - e) Operation of the gate.
 - i) The gate will swing closed against the lip of the culvert and concrete pad.
 - ii) When fully opened, the gate will rest against the culvert wing structure.
 - iii) A 3rd pole will be installed when the gate is opened which can be locked in place to prevent closure.
 - iv) The gate will be locked in an open position when temporary pumping is not in use.
 - f) The vertical steel pipes for swing gate and closure/open mechanisms will be set in auger holes with concrete. A minimum depth of 52" is desired to prevent movement due to frost/thaw cycles.
 - g) An alternative to the gate structure recommended is either an Orbinox SA stop log Penstock or an Orbinox RB Weir Penstock, depending on the diameter and layout of the existing culvert.

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Either one is easily adjustable to whatever height is needed to maintain the desired level close to the OHWM, or the agreed upon short term temporary level. (Refer to Crane Engineering Jan 27th email response to review of the pump build proposal, available on the Town of Marion website, Town Information, Lake Districts, Silver Lake: <http://townshipofmarion.com/lake-districts/silver-lake/>).

- 5) Electric Pump discharge outlet. An 8" fire hose connection coupler will permanently be mounted to the concrete pump pad.
 - a) Position and direction of the coupler will be placed as such to allow a 100 ft section of 8" fire hose to be connected with gradual bends through the bottom of the Hwy 21 culvert.
 - b) The fire hose will lay on the bottom of the culvert during temporary pumping operations.
 - c) The fire hose will connect to the interior culvert side of a double coupler welded to the 18" high open frame gate structure.
- 6) Irogami Lake discharge outlet.
 - a) A dual hose coupler is welded to the open middle panel of the 18" high gate structure.
 - b) The Irogami outlet side of the coupler will allow connection of an 8" rigid pipe structure angled down to the spillway pad with a 45-degree elbow.
 - c) The end of the pipe on the Irogami spillway will have a fan dispersion nozzle. This nozzle spreads the outlet force of the pumped water over a greater area of the spillway, preventing erosion.
 - d) If necessary, an additional concrete pad will be placed to prevent erosion of the Lake Irogami Bottom (Comparable as to what is used at boat launch ramps)
- 7) Temporary Electric Pump specifications
 - a) Maximum flow rate of 3000 GPM
 - b) Pump control flow Variable Frequency Drive (VFD) which can be set down to a running usage of 1500 GPM and as low as 1000 GPM.
 - c) At a pump flow rate of 1500 Gals/Min * .133681 Cu Ft/1 Gal * 1 Min/60 secs = 3.34 Cu ft/Sec.
- 8) Temporary Pumping will be operated by Silver Lake Management District upon mutual agreement with Lake Irogami Management District.
 - a) Times, period of use, and volume flow of water will be agreed upon by Silver and Lake Irogami Management Districts within a formal agreement.
 - b) Temporary pumping is intended to use Lake Irogami as a conduit of water to the Weir outlet on 20th avenue. Pumping of water from Silver to Irogami via the culvert will be when the weir outlet is at minimum or no flow conditions of normal lake water.
 - c) The OHWM established for Lake Irogami is not affected.
 - d) Pumping is intended to drop the elevation of Silver Lake to no less than its OHWM to provide a cushion for extra ordinary rain events.

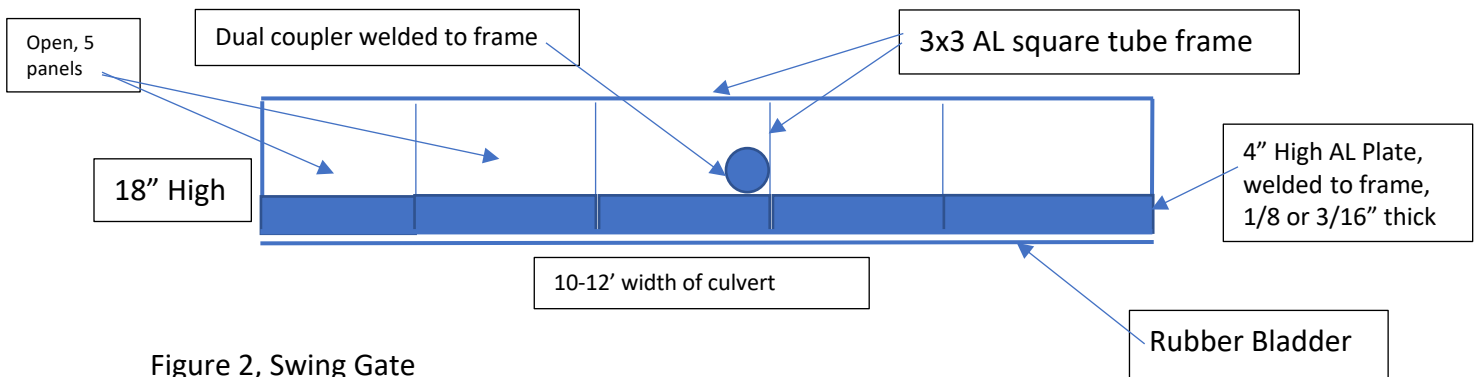


Figure 2, Swing Gate