GEI Consultants

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September 15, 2023

Mr. Ken Recker, P.E. – Chief Deputy
Livingston County Drain Commissioner
2300 E. Grand River Ave. #105
Howell, MI 48843

RE: Thompson Lake Dam – Proposal and Cost Estimates

Mr. Ken Recker, P.E.

This letter summarizes proposed costs for potential improvements and/or rehabilitation to the existing Thompson Lake Dam structure and correcting a downstream piping issue and corroded bottom of the existing 72" CSP at the pathway crossing located several hundred feet downstream. We have included all costs for which we think would be necessary for totally financing of both of these items, including engineering, public notice, permitting, public engagement, bidding, construction, surveying and even a 10% contingency on all costs. Attached to this letter is a sketch of an option for rehabilitation of the existing Thompson Lake Dam structure that we received from one of our dam structural engineers and was used in preparing proposed costs. Please understand that the costs provided would apply for several variations of the design sketch we provided, including different hoist types or similar types of concrete structure refurbishments.

For the work on the existing downstream 72" CSP crossing from the Thompson Lake Dam, we understand that there is piping taking place around the upstream end along both sides of the pipe and the other issue is that there is corrosion in the pipe at the haunch points near the bottom, further impacting the piping issue taking place along the length of the existing pipe. We are proposing to use sheet piling as wing walls on the sides of the upstream end of the pipe and then also install a small concrete apron on the bottom and up slightly up the sides of the ditch on the upstream side of the pipe crossing to connect in with the steel sheet piling wing walls. To connect the concrete intake apron and steel sheet piling wing walls we would drill small holes into the sheet piling and extend rebar through those holes and connect those to the steel rebar placed for the concrete intake apron. This will ensure that further displacement or additional piping won't continue with the crossing and that all water will enter the pipe. Additional evaluation is necessary of the pipe regarding the corrosion issue, however to remedy this issue, we are proposing to use steel plates (used for constructing plated CSP pipe) as repair pieces to be placed over areas where water is getting out of the pipe and then connecting those repair plates to portions of the existing pipe that are in stable condition. Once these repair pieces are installed, we are then

proposing to use spin lining to coat the inside of the pipe with a thick waterproof coating over the entire length of the existing pipe. Once this is completed, flowable fill, which would be placed under high-pressure conditions, would be backfilled along the pipe on both sides to fill in any existing voids created by the existing piping around both sides of the crossing.

Regarding the Thompson Lake Dam structure, the concrete at the top of the existing outlet structure, the guardrail post connections and the stoplog operations are all in poor condition. Plans to rehabilitate the concrete structure and improve stoplog operation of the Thompson Lake Dam include the following:

1. Try to locate as-built structure drawings for both items. The Wade Trim 1998 Engineering Plans are not what was constructed. Actual as-built plans would assist in design.
2. Perform a site visit to evaluate existing conditions and perform survey measurements of both items. Evaluate drop structure to precast culvert connection to see if repairs are needed to the joints.
3. Work to be performed in lake drawdown condition.
4. Access to the work to be over the dam embankment. Limit equipment size to prevent damage.
5. Grating and guardrails to be removed. Save for reconfiguring and reinstallation.
6. Remove all steel components and existing anchor bolts at drop structure and wing walls. This includes the sluice gate system and embedded components. Do not damage sluice gate components.
7. Remove (sawcut and properly dispose of) top 3 feet of existing concrete structure. Remove small areas of deteriorated wing wall concrete capping. Remove damaged concrete at wing wall corners.
8. Design new concrete walls to include doweling into existing concrete. Dowels to carry lateral water loading at new stoplog blockout. Determine top of concrete elevation that works best for operations. Include waterstop details in the design. Concrete mix to include air entrainment and water flow inhibitors (xypex) for longer term durability and leakage reduction.
9. Design new stoplog blockout framing to include a lifting beam to support portable come-along or chainfall hoists. The hoists would be stored off-site and brought to the dam when needed. We also evaluated using a swing arm with simple lift hoist for this operational task as well and feel that both methods would work and be relatively the same costs.
10. Determine if short, existing top of concrete wall stoplogs are needed in the new design. Do not include unless requested by owner.
11. Design new supports for the existing grating, to be reused. New framing angles (galvanized or stainless steel) may be needed to match new wall configuration.
12. Evaluate existing guardrail post support structures. Specify proper grouted in anchorage for existing plates, or design new plates for anchorage.
13. Prepare a set of drawings of proposed rehabilitation for owner's review. Incorporate comments and prepare a final, for bid and construction set of drawings.
14. Obtain required permits (EGLE, City, SESC, etc).
15. Provide necessary lake-draw-down notifications and hold a public informational meeting with Lake or Drainage District residents to review the work.

16. Solicit bids and retain a contractor for the work.
17. GEI engineers to assist owner during construction with RFI responses and other requests. Allow two site visits during construction by GEI.

Below is a summary of all proposed costs for this work. If you would like additional detail regarding any of these cost elements then please let us know because that can be provided. As mentioned prior, the total proposed costs listed encompasses all engineering related work and all construction necessary to make all improvements as proposed in this letter. This should be treated as a 'total financing amount' to complete all work regarding this project.

PROPOSED COST SUMMARY

Construction of Thompson Lake Dam rehabilitation and structure improvements = $158,100

Construction of 72" pipe crossing rehabilitation and improvements = $127,500

Engineering (design, permitting, surveying, bidding, public mtg, const. admin, etc.) = $40,700

Contingency (10%) = $32,360

Total Proposed Cost = $358,930

Should you have any questions please contact me on my mobile number at 517-449-3478, thanks.

Sincerely,

Brian J. Cenci, P.E.

Attachments (1): Design sketch of Thompson Lake Dam proposed improvements

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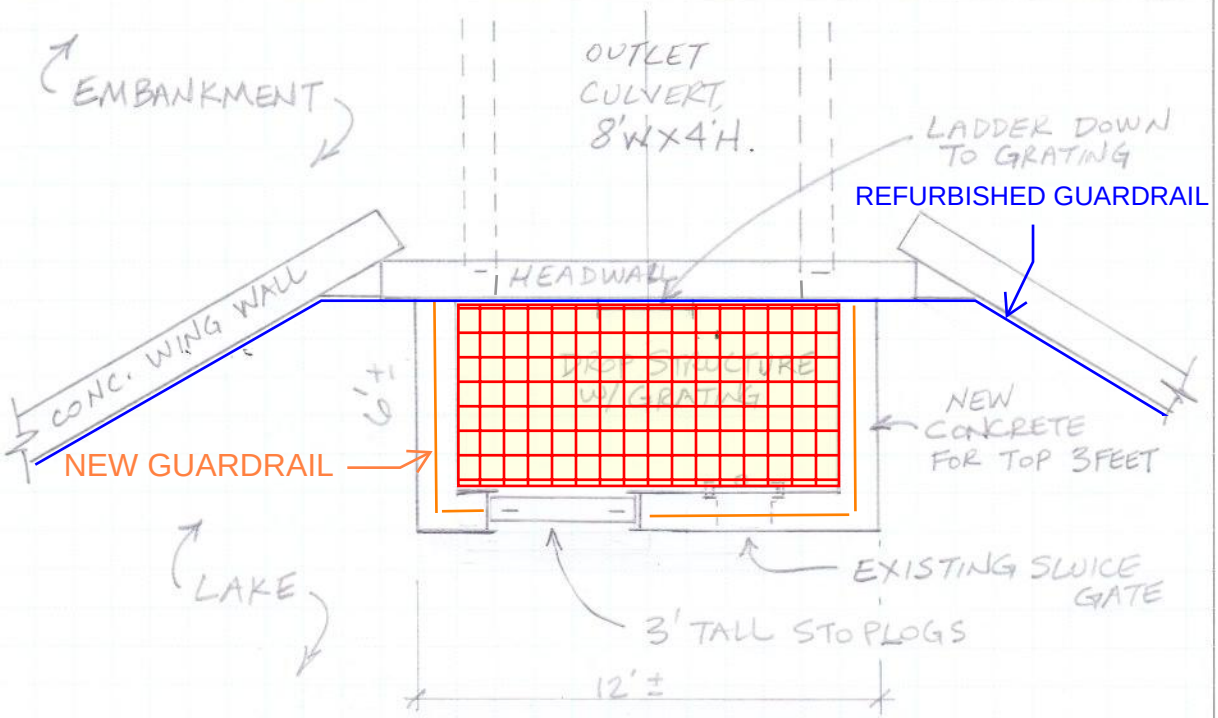

PLAN VIEW

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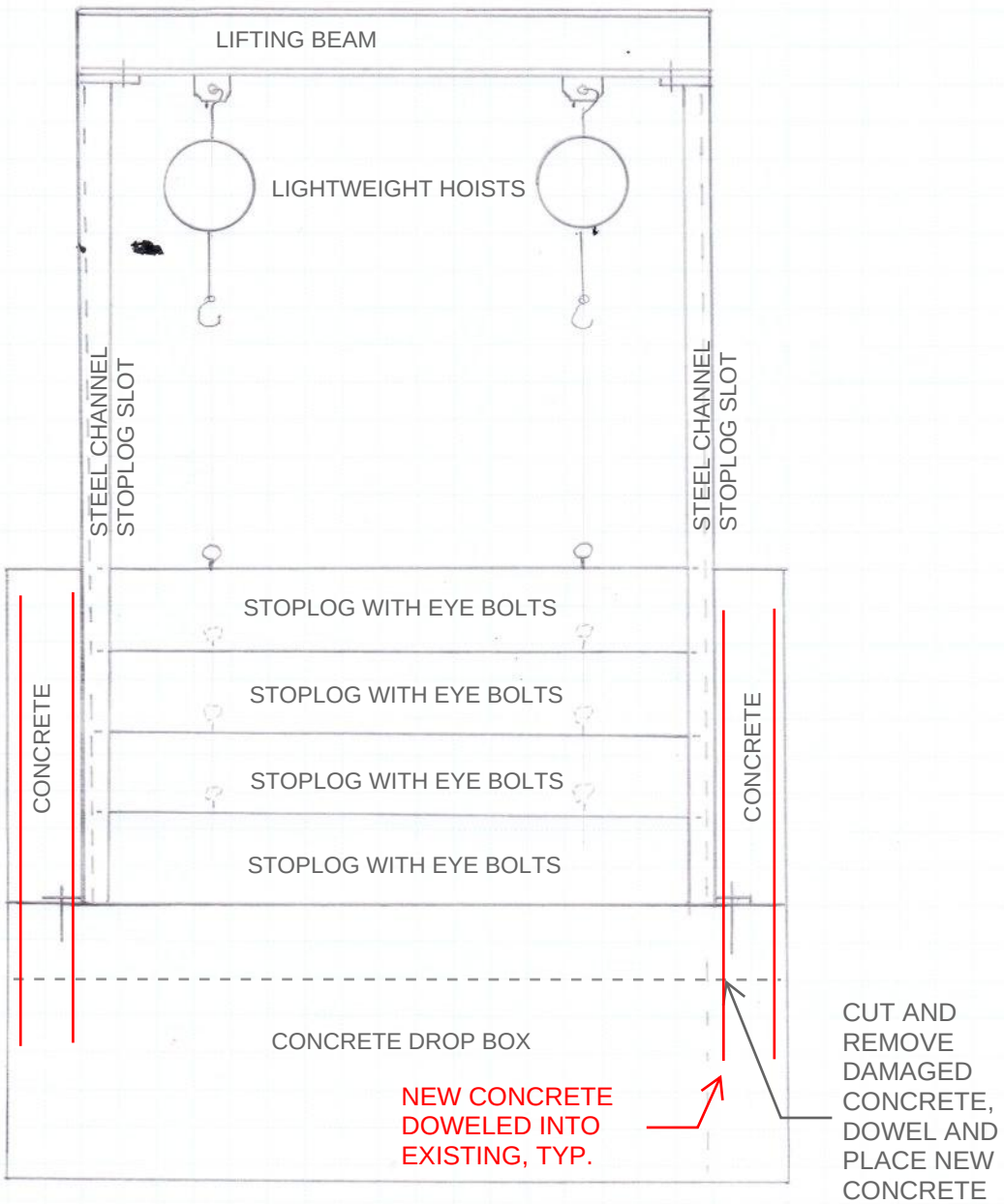

ELEVATION VIEW AT NEW STOPLOG FRAMING