

January 31, 2022

Crystal Johnson
City Manager, City of Granite Falls
641 Prentice Street
Granite Falls, MN 56241

Re: Updated Cost Estimate for Granite Falls Hydroelectric Powerhouse Repairs

Dear Ms. Johnson:

The City of Granite Falls has requested that Barr Engineering Co. (Barr) summarize and update the maintenance, repairs, and improvements needed at the City's hydroelectric facility. The purpose of this update is to provide Barr's opinion of cost for the City to use in applying for funding from the State of Minnesota's Renewable Development Account (RDA). This is a continuation of previous evaluations, design, estimating, and construction that began in 2020. Additional items have been discovered since the unit #3 replacement and the 2021 powerhouse repair projects were developed, and RDA funding was initially requested.

RDA funding was obtained by the City in 2020 based upon Barr's 2020 preliminary cost estimate that was prepared prior to completion of engineering. Bids for the unit #3 replacement project were higher than anticipated and additional repair scope was identified both during and following construction of the powerhouse repairs in 2021. This letter summarizes Barr's understanding of the additional repair scope and provides a preliminary order of magnitude cost for the City's use when applying for funding.

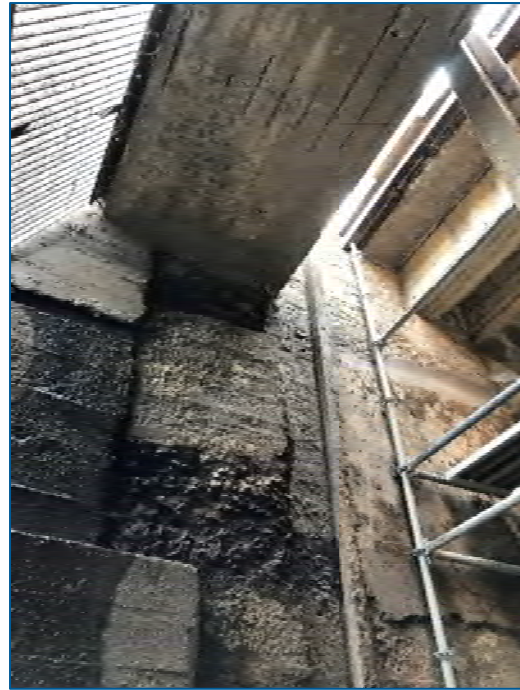
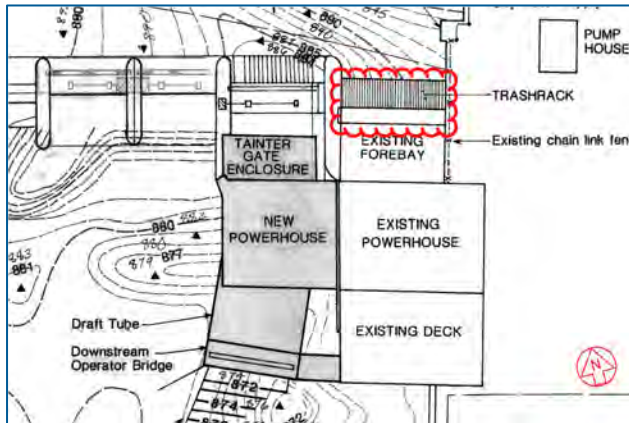
Funding Request Items

The following sections provide a description of the items requiring repair not covered by the 2020 RDA funding request that form the basis of this updated estimate. Plan views of the facility locating the items, a photograph of the items when available, and cost breakdowns are also included.

1. Intake Area Concrete Repairs

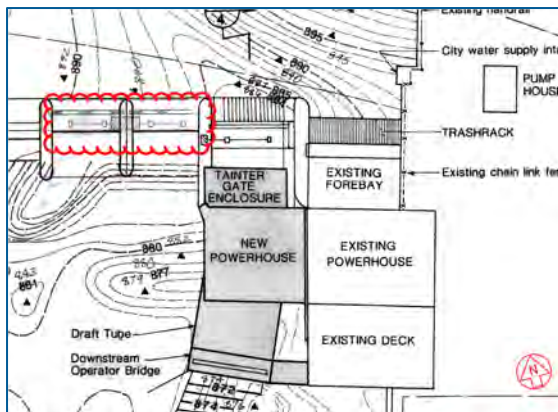
The concrete surrounding the intake gate slots for unit #1 and #2 and the two steel columns that serve as intermediate supports for the intake gates were observed during the head-pond drawdown completed for the intake gate slot repairs that were constructed as part of the 2021 powerhouse repair project. The intake area concrete is in poor condition and needs repair. The steel columns have severely corroded and

need to be replaced since they will not safely support the hydrostatic load from the intake gates in their current condition.



2. Flood Gate Seals

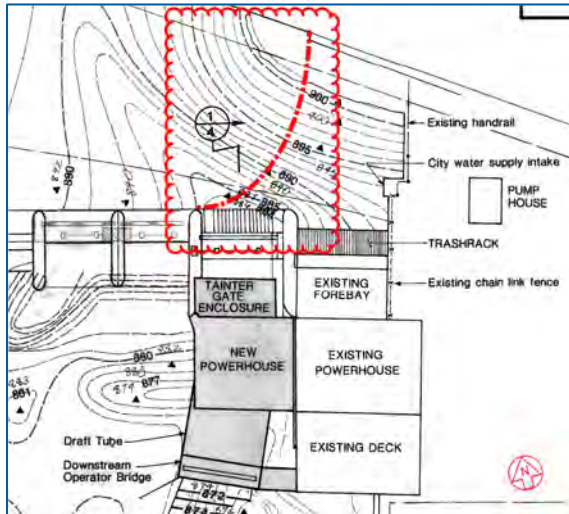
Two radial (tainter) flood gates are located to the right (west) of the powerhouse. Leakage through the gates has become excessive and results in significant ice formation in the winter that prevents gate operation. The seals on these gates need to be replaced. This work would require a partial drawdown of the head-pond and installation of temporary bulkheads to dewater the gate face and install the new seals.



3. Debris Boom

Debris such as tree branches collects in front of the powerhouse intake area and causes the intakes to plug and the generators to trip offline. To help mitigate this operational problem, a debris boom is to be installed upstream of the powerhouse. The debris boom would span between the upstream riverbank on the left (east) side of the river and the right side of the intake for unit #3. Installation of the boom would

result in less powerplant down-time and maintenance while also improving public safety. The photograph below is an example from a different site.



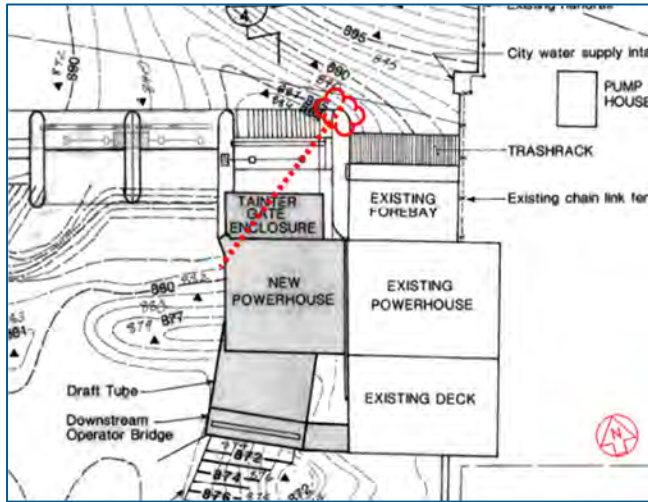
4. Unit #3 Replacement Bid Amount Difference

Bids received for the unit #3 replacement project were higher than anticipated despite conservative planning, use of normally reliable information sources, and twice bidding of the project to obtain more competitive pricing. Also, estimating for the replacement was done prior to the COVID-19 pandemic and the material cost increases that resulted from it. The following table provides a breakdown of the additional costs required for the unit #3 replacement project.

5. Low Level Outlet Valve Replacement

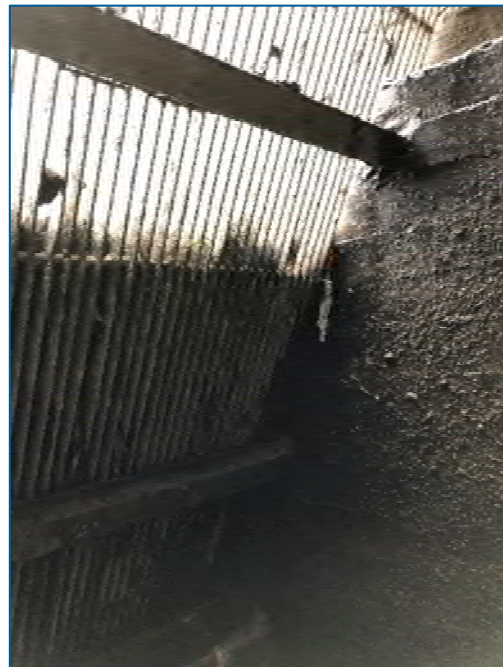
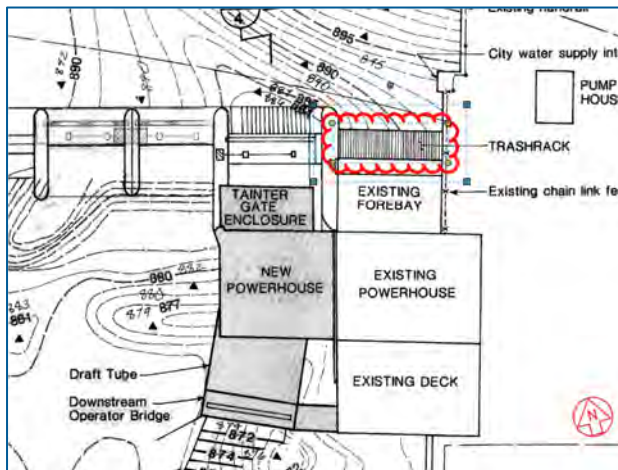
A 12-inch diameter pipe was installed below the unit #3 area of the powerhouse in the mid-1980's to drawdown and pass water during times when the headwater is below the sill elevation of the floodgates. A valve was also included on the upstream end of the pipe so that the pipe could be closed when not in use. The valve is no longer functional and water flows through the pipe uncontrolled, thus it needs to be

replaced. Replacing the valve will enable more flow to pass through the turbines thereby improving the plant's efficiency and improve dam safety by preventing uncontrolled flow through the pipe.



6. Trash Rack Support Steel Replacement

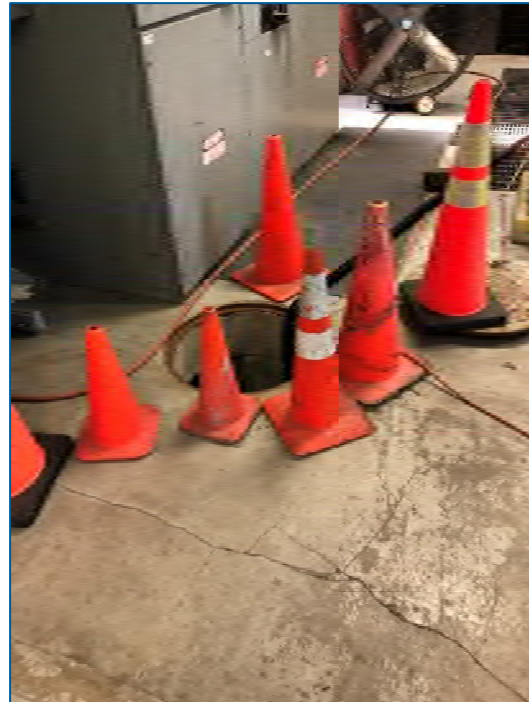
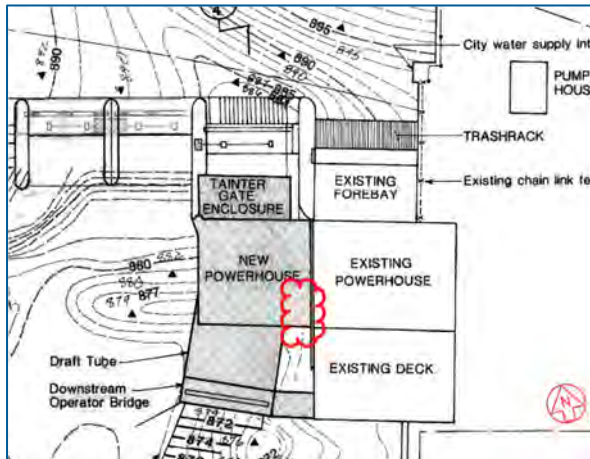
Trash racks are located upstream of the intakes. The steel supporting the trash racks for unit #1 and #2 was observed during the head-pond drawdown done for the intake gate slot repairs in 2021. The steel supporting the trash racks is in poor condition and should be replaced or repaired.



7. Vault Access and Secondary Overflow Valve Installation

Overflow water from the unit #2 turbine pit flows into a large cavity (vault) located in between unit #2 and #3. Personnel access into this area is considered to be unsafe and requires a fixed ladder and

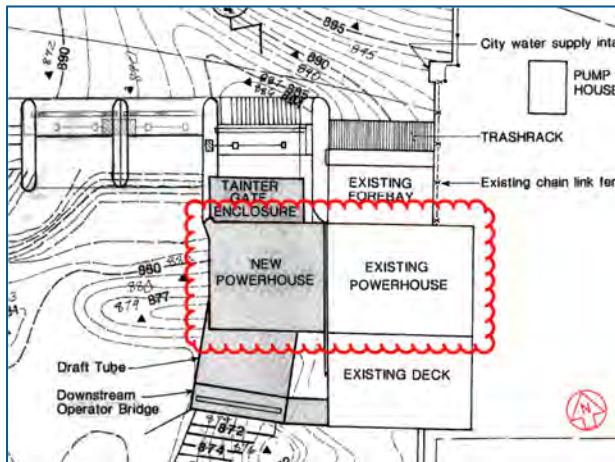
supplementary access platform for access to maintain the overflow valve. A secondary overflow valve is also needed. Protection from freezing for the existing and new valves is also needed.



8. Recoating Powerhouse Exterior and Warning Sign Replacement

The exterior coating of the powerhouse has exceeded its life expectancy and needs recoating. Most of the building requires cleaning and painting. The area where concrete repairs were performed require reapplication of the swirl/parge coating to blend with the balance of the adjacent exterior prior to

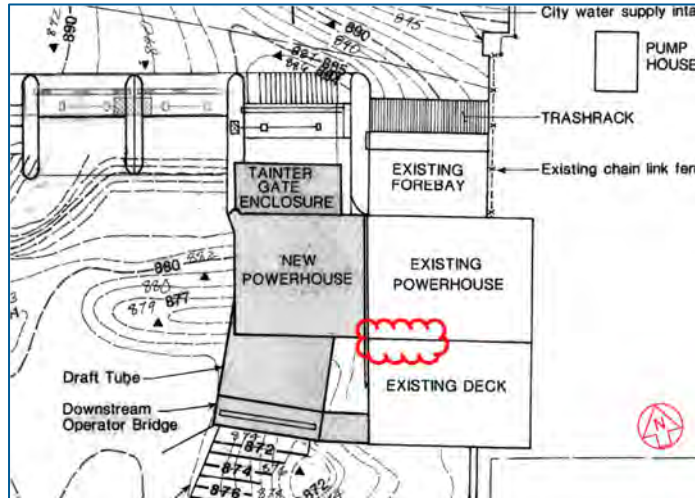
repainting. As a part of this work scope, a public safety warning sign on the downstream face of the powerhouse needs replacement.



9. Downstream Powerhouse Wall Concrete Repairs

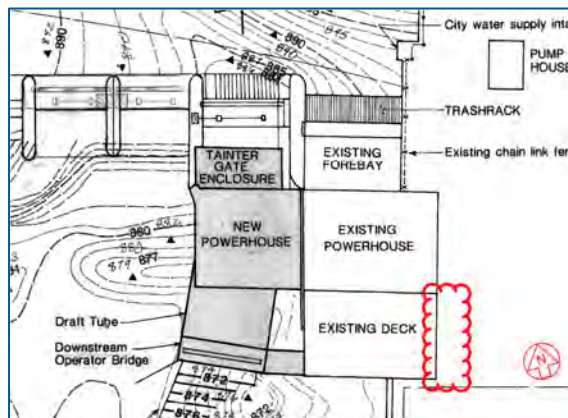
Concrete repairs performed in 2021 were scoped based upon two defined areas that were visibly deteriorated. As a part of the project, the swirl/parge coating that had been applied over the walls was

removed in its entirety over a large portion of the downstream wall which revealed additional deteriorated concrete that was not included in the 2021 repairs.



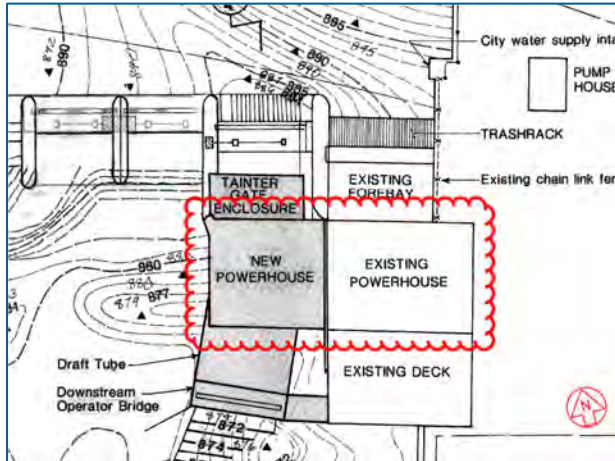
10. Retaining Wall Repair/Replacement

The concrete retaining wall on the downstream/left side of the powerhouse is deteriorated and needs repair and/or replacement. The repair would also incorporate drainage to alleviate seepage originating from the parking lot or old water plant area.



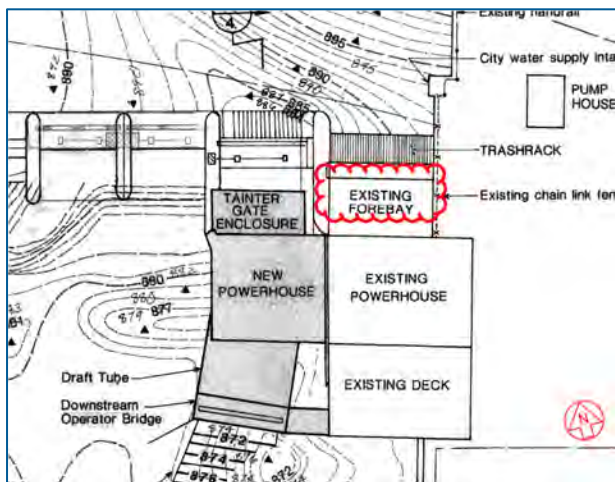
11. Temperature Control in Powerhouse

Excessive summer heat in combination with heat from the generators in the powerhouse have caused the units to trip offline and has caused melting of equipment within the electrical cabinets. A system of controlling excessive heat in the summer is needed to protect the operating equipment.



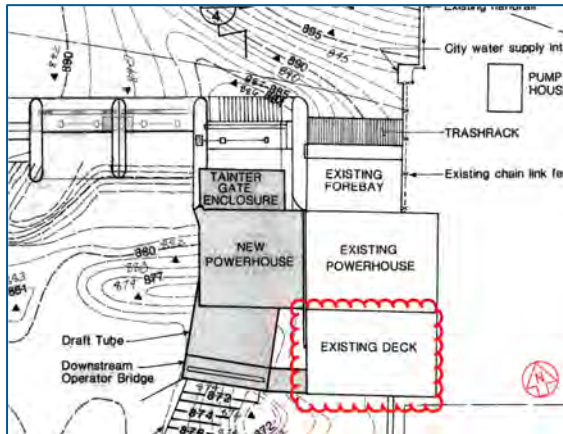
12. Intake Gate Hoist System Repairs

Anchorage of the steel that supports the intake gate hoist has failed and requires supplemental anchorage. The hoist used to lift the gates has exceeded its useful service life and needs replacement.



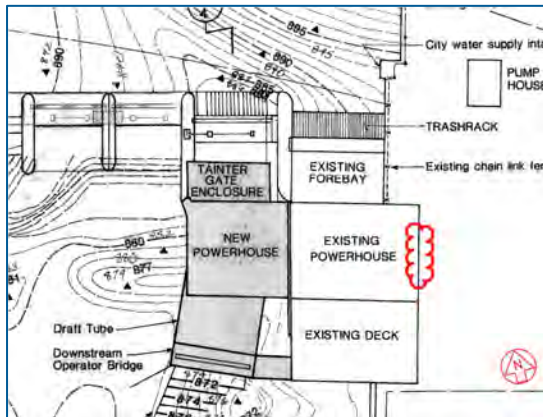
13. Dive Inspection & Misc Concrete Repair in Tailrace Under Units #1 and #2

The tailrace area beneath the unit #1 and #2 turbines was last accessed and repaired during the unit #1 and #2 turbine replacement project that was completed in 2016. It is important that the concrete be assessed on a semi-regular basis so that the integrity of the powerhouse supports is maintained. Access to this area would require divers experienced in concrete assessment and repair.



14. Double-Door Replacement

The double-doors used for bringing equipment in and out of the powerhouse have exceeded their useful life and require replacement.



Funding Request Estimate

Engineering design for the items identified and estimated herein has not been completed so there are numerous unknowns that are difficult to quantify with a high degree of certainty. An approximate cost estimate has been prepared for this work based upon current information; however, the costs will likely vary as the design is completed and bids are obtained.

Table 1 Engineer's opinion of cost

Item No.	Item Description	Estimate
1	Intake Area Concrete Repairs	\$400,000
2	Flood Gate Seals	\$160,000
3	Debris Boom	\$110,000
4	Unit #3 Replacement Bid Amount Difference	\$490,000
5	Low Level Outlet Valve Replacement	\$90,000
6	Trash Rack Support Steel Replacement	\$230,000
7	Vault Access and Secondary Overflow Valve Installation	\$90,000
8	Recoating Powerhouse Exterior and Warning Sign Replacement	\$110,000
9	Additional Downstream Powerhouse Wall Concrete Repairs	\$40,000
10	Retaining Wall Repair/Replacement	\$320,000
11	Temperature Control in Powerhouse	\$40,000
12	Intake Gate Hoist System Repairs	\$40,000
13	Dive Inspection & Misc Concrete Repair In Tailrace Under Units #1 and #2	\$160,000
14	Double-Door Replacement	\$10,000
	Total	\$2,290,000

Table 1 is a summary of order of magnitude estimated costs that can be used for planning purposes and for applying for RDA grant funding. The project costs provided have been made based on Barr's experience and qualifications and represents our best judgment as experienced and qualified professionals familiar with the project. The cost opinion is based on project-related information available to Barr at this time without completion of any design work. The opinion of cost may change when designs are completed. In addition, since we have no control over the cost of labor, materials, equipment, or services furnished by others; over the contractor's methods of determining prices; or over competitive bidding or market conditions, Barr cannot and does not guarantee that the proposals, bids, or actual construction costs will not vary from those shown in Table 1.

Thank you for the opportunity to work with you. If you have any questions or comments, please contact me at (952) 832-2976.

Regards,

Cordelle Thomasma, P.E.