MEMORANDUM

TO: Board of Trustees

THROUGH: Indra Winquest
District General Manager

FROM: Brad Underwood
Director of Public Works

SUBJECT: Review and discuss Granite Construction's Findings of Memorandum for the Effluent Export Pipeline - Project 2524SS1010 and Effluent Pond Lining Project 2599SS2010

DATE: May 3, 2021

I. RECOMMENDATION

That the Board of Trustees concurs with recommendations to:

1. Solicit an updated and phased proposal from Jacob's Engineering for the Effluent Pond Lining Project 2599SS2010.

2. Solicit an updated and phased proposal from HDR for the Effluent Export Pipeline Project 2524SS1010.

II. BACKGROUND

At the January 28, 2021 Board of Trustees Meeting, District Staff presented for approval the contract with Granite Construction to be the Construction Manager at Risk (CMAR) for the pre-construction services for the Effluent Export Pipeline and Effluent Pond Lining Project. Granite Construction has reviewed the historical documents regarding this project and has presented their finding memorandums to District Staff for both the Effluent Export Pipeline and Effluent Pond Lining projects (Exhibit A and Exhibit B attached).

The Board of Trustees has previously been informed of the need for these two projects. The effluent pipeline project is needed to rehabilitate or replace approximately 29,664 linear feet of 16-inch pipe which has reached the end of its useful life. This work may involve immediate repairs to some segments of the pipeline that are critical in nature. Additionally, IVGID's current operating permit with the Nevada Department of Environmental Protection (NDEP) no longer allows the District to utilize the primary effluent storage basin due to it being unlined. IVGID identified the need for the pond, and thus the lining, to allow for its use to store effluent and provide operational flexibility within the system.

In both of the finding memorandums, Granite Construction has outlined their summary of recommendations to include; select designer, partnering meeting, develop design and permitting timeline, identify first order work areas (identifying pipeline critical repairs)/ critical path activities (pond liner), complete additional field investigation (pipeline only), and preliminary cost estimates.

Granite Construction recommends selecting the consultants that have been working on this project previously. HDR (pipeline) and Jacob's Engineering (pond lining) have institutional knowledge regarding these projects and would eliminate the time required for a new consulting firm to become fully familiar with the project. Granite Construction has worked with both firms on other projects and believe the firms are well suited for this type of project. Staff concurs with this recommendation.

The design engineers, Granite Construction and Public Works staff will work as a team to review previously proposed construction methodologies and investigate newer materials and installation methods.

For the pond lining project, the team will review the HDPE lining and concrete/shotcrete combination lining options. Granite will develop a current preliminary cost estimate for each methodology. A review of the initial cost, lifecycle analysis and future maintenance of each option will be analyzed to determine the most advantageous installation.

For the export pipeline project prior to selecting the pipe material types and installation method, the team will verify the actual pipe pressures and pressure transitions. To determine this information additional field investigations may be required. Preferred design alternatives will be developed and analyzed to determine the best suited pipe material and installation method for the various segments of the pipeline. Granite will develop a current preliminary cost estimate for each methodology which shall aide in the final design of construction materials and installation.

To assist in project success, Granite has recommended a partnering meeting with the design team and stakeholders. This will be advantageous in allowing, early on, the parties to voice and address concerns, provide opportunities for collaboration, and establish clear expectations for design, permitting and construction of the projects. Required permitting timelines from the various agencies will be key to establishing the overall project schedules.

III. BID RESULTS

This item is not subject to competitive bidding within the meaning of the Nevada Revised Statutes 332.115.

IV. FINANCIAL IMPACT AND BUDGET

The 2020-2021 CIP budget includes the Effluent Pipeline Project CIP 2524SS1010. In July 2020, the Effluent Pond Lining Project was broken out into CIP Project 2599SS2010 but no funds are included in the 2020-2021 CIP Budget. A budget of $1,900,000 is allocated for project design and construction services, see attached Exhibit C Effluent Pipeline Project – Data Sheet.

V. ALTERNATIVES

None proposed.

VI. BUSINESS IMPACT

This item is not a "rule" within the meaning of Nevada Revised Statutes, Chapter 237, and does not require a Business Impact Statement.

Attachments:

- Granite Construction Project Review Memorandums:
  - Exhibit A - CMAR Pre-Construction Services Task 2, Item C Findings Memorandum for Effluent Export Pipeline, dated April 30, 2021
  - Exhibit B - CMAR Pre-Construction Services Task 2, Item C Findings Memorandum for Pond Lining, dated April 30, 2021
- Exhibit C - Effluent Pipeline Project – Data Sheet

EXHIBIT A

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Date: Friday, April 30, 2021

To: Nathan Chorey, Engineering Manager, IVGID

From: Brian Roll, Project Director
John O'Day, Project Manager
Cody Cummings, Preconstruction Services Manager
Keith Oxner, Rehabilitation Technology Expert, Granite Inliner
Jason Walborn, Director of Business Development, Granite Inliner

RE: **CMAR Pre-Construction Services**
Task 2, Item C – Findings Memorandum for Effluent Export Pipeline

General:
Per the IVGID 2021 Effluent Export Pipeline & Pond Lining Project scope of work for preconstruction services, Granite provides this memorandum of findings summarizing our preliminary evaluation of background material for the Effluent Export Pipeline portion of work. The Project will consist of rehabilitating or replacing approximately 29,664 LF of 16-inch effluent export pipeline. The pipeline is classified into two segments: Segment 2 is welded, cement mortar lined, high-pressure steel pipe from the Spooner pump station to approximately 14,800-feet south. Segment 3 is cement mortar lined, low-pressure bell and spigot pipe that extends from Segment 2 up to the Spooner Meadow Creek crossing. This memorandum identifies additional information we believe is necessary to; complete the project design, evaluate various pipe rehabilitation methods, provide accurate construction costs, and develop a project construction schedule.

The memorandum includes:
1) A review of Background Information.
2) A discussion of General Project Information.
3) A discussion of the Project Design Criteria.
4) A discussion of Pipe Materials.
5) A discussion of Proposed Pipeline Alignment.
6) A discussion of Geotechnical Conditions.
7) A discussion of Existing Utilities.
8) A discussion of Permitting.
9) A discussion of Traffic Analysis & Impacts.
10) A discussion of Project Implementation.
11) A summary of recommendations and proposed next steps.

Granite Inliner has reviewed the documents and has provided a summary of their findings of the potential application of trenchless technologies as an alternative to open cut construction methods within this memo. Further investigation and design evaluation will be required before determining the best project solutions.

Background Information:
Several information sources were evaluated in the development of this memorandum and are listed below. This list is not all-inclusive of this Project's information but represents the most relevant background information reviewed.

- IVGID Project No. 69-2 Spooner Summit Pipeline Record Drawings, prepared by Clair A. Hill & Associates, dated June 1970.
- Hydraulic Operation Evaluation, prepared by HDR, Inc., dated March 2003.
- Evaluation of Wastewater Flows, prepared by HDR, Inc., dated July 15, 2003.
- Pipeline Rehabilitation Alternative Analysis, prepared by HDR, Inc., dated January 23, 2004.
- Nevada Department of Transportation (NDOT) Culvert Crossings, prepared by HDR, INC., dated January 23, 2012.
- Incline Village General Improvement District – Effluent Export Project, Phase II Preliminary Design Report, prepared by HDR, Inc., dated June 21, 2012.
- IVGID 2015 Effluent Export Pipeline 16-inch Steel Preliminary Report (rev 3.5), prepared by PICA Corp, dated February 23, 2016.
- Effluent Export Pipeline Condition Assessment: Locations of Interest Memorandum, prepared by HDR, Inc., dated August 2, 2016.
- Water Resource Reclamation Facility (WRRF) Effluent Storage Alternative Analysis, prepared by Jacobs Engineering, dated September 2018.
- Excerpt from January 29, 2020 IVGID Board Packet applicable to the Effluent Export Project.
- IVGID 2/26/2020 Board Meeting General Business Item G.1. Authorize a Professional Services Agreement with Jacobs Engineering for the Effluent Pond Lining.
- IVGID 2/26/2020 Board Meeting General Business Item G.2. Authorize a Professional Services Agreement with HDR, Inc. for the Effluent Export Pipeline.
- Incline Village Effluent Export Pipeline Condition Assessment, prepared by HDR, Inc., dated July 2, 2020.
- Granite also met with IVGID Public Works staff to discuss the existing effluent export line, improvement alternatives, and Project goals.

General Project Information:
There appears to be conflicting information and discrepancies between various reports on the actual footage of welded steel pipe (high-pressure) versus gasketed bell and spigot pipe (low-pressure). Segment 2 is 17,314-feet and Segment 3 is labeled 12,385-feet. Granite has determined that the change of pipe type occurs at STA 373+00, as indicated in the original plans dated 1969. HDR's Preliminary Design Report (PDR) dated June 21, 2012 states: 18,300 LF of high pressure and 13,700 LF of low pressure. It appears that both the high-pressure and low-pressure quantities might be overstated, and we recommend confirmation of the actual footage and location of each segment before finalizing the design.

HDR's 2012 Preliminary Design Report (PDR) states that the maximum flow that the Spooner Pumping Station delivers is approximately 2,100 gallons per minute (GPM), or approximately 3.0 million gallons per day (MGD). The corresponding flow velocity is approximately 3.3 ft/s. The Spooner Pump Station's operating pressure, which is 855 vertical feet below Spooner Summit, is 440 PSI (84% static head).

There have been several attempts at soliciting a project to complete repairs since 2012, with the priority being to replace Segment 3 and make immediate repairs to Segment 2, focusing on areas at high risk of failure. IVGID's Board memo dated February 11, 2020, requested approval for HDR be selected to design

5,067 linear feet (LF) of pipeline for immediate replacement on a section of pipeline that is planned outside of the second phase of the Lake Tahoe East Shore Trail where co-locating the pipeline was deemed not feasible. Further discussion with IVGID and the Design Engineer should occur to determine the current priority of pipeline repairs and project phasing. Detailed analysis of the data provided by Pipeline Inspection and Condition Analysis Corporation (PICA) can help determine critical repair areas in which the project team should prioritize project phasing.

Previous project estimates provided by HDR assumed construction over 3 to 5 seasons with an estimated cost of nearly $18 million, including design, construction, administrative cost, and a contingency. These estimates are based on evaluating the open cut method of installing a new pipe in a new alignment and abandoning the old pipe (full removal or abandoned in place). Open cut method cost estimates were developed in 2012 and are likely not representative of today's current market.

The HDR Pipeline Rehabilitation Alternative Analysis (January 23, 2004) provides a brief overview of various trenchless technologies available at that time but does not include any cost estimates or recommendations for its use or non-use. Additionally, the 2012 PDR states, "it is not anticipated that trenchless construction will be required for any portion of the alignment." This is likely due to concerns about trenchless pipeline rehabilitation's ability to meet the high pressures of the IVGID pipeline. Since this analysis was performed, technological advancements may have occurred with regards to trenchless technology. We will further evaluate trenchless rehabilitation for comparison against open cut replacement for the team to determine best-for-project solutions.

The most recent project timeline indicates construction commencing in 2021 and completion in 2023. Due to delays in engineering design and other external challenges, the timeline will realistically shift to construction starting in 2022 for major pipeline repairs, with potential project completion as late as 2027.

It is estimated that the design and permitting process could take 9-10 months to complete (estimate provided in HDR PDR memo). This timeline is concerning due to the immediate need to make repairs in critical pipeline locations as well as the amount of pipe that needs to be replaced. Additionally, the design schedule will need to be expedited to meet an aggressive construction schedule of completing the pipeline repairs over the next three seasons. To keep the project moving forward, we recommend selecting the design firm as soon as possible. Once a design firm is under contract, Granite will assist with developing the design schedule and determine necessary advancements to achieve critical project milestones.

Based on HDR's in-depth understanding of the pipeline and their previously completed preliminary design, Granite recommends selecting HDR as the lead design engineer for the Project's pipeline portion. We believe this will help to expedite the permitting and design process.

Lining of the pond will play a vital role in the construction of the new pipeline, especially where it is determined that trenchless technology can be used for rehabilitation. The additional storage capacity of the new pond will provide for longer service outages of the export pipeline, which in turn will create efficiencies and potential cost savings for lining the pipe. Since the pond will be used for storage during pipeline construction, **Granite recommends the pond lining design be completed concurrently with that of the pipeline design. (See Granite's Findings Memorandum for Pond Lining).**

If extensive time is required for the design of the pond lining, we recommend proceeding with the evaluation and identification of critical repair locations. If deemed as emergency work, this scope could be completed under the existing TRPA Memorandum of Understanding (MOU). Based on the emergency work scope, the required NDOT right-of-way permit can be more easily obtained. We believe this could enable

work to begin as early as the fall 2021 utilizing the current effluent storage capacities. In addition, there may be opportunity to perform emergency repairs on portions of the pipeline that are outside of the identified colocation areas.

Project Design Criteria:
Design information provided in the reviewed documents recommends the pipeline design be based on a buildout capacity of 2,880 gallons per minute (GPM), or 4.15 million gallons per day (MGD), and should be designed to allow for 200 to 440 PSI operating pressure in high pressure segments and less than 200 PSI operating pressure in low pressure segments. **Granite recommends verifying this information prior to making the final selection of pipe rehabilitation method.** The elevation gain from the Spooner pump station to the summit is 855 feet. The friction loss is approximately 163 feet. The Spooner Pumping Station discharge header pipe will see a pressure of 440 psi; approximately 84% of the pressure is static head. In locations where operating pressure is higher than 250 PSI, this will limit the alternative options for pipe rehabilitation, such as trenchless technology and alternative pipe materials. **Granite suggests rather than categorizing the pipe as high and low pressures, we analyze the pipe within the actual pressures to best determine the appropriate materials and rehab technologies for each segment.**

The maximum surge pressure is approximately 100 PSI, and the recommended test pressure is 110% of operating pressure; therefore, the highest-pressure sections should be tested at 595 PSI (rounded to 600 PSI) or 136% of operating pressure. HDR's 2012 PDR stated that the precise location of varying pipe pressures needs to be determined through further investigation and final design. Granite reviewed HDR's Technical Memo (dated January 23, 2004), including a graph of Hydraulic Grade and Pressure Line for Segments 1-3. It is critical to know precise locations where the pipeline transitions from high to low pressure to determine the best value, rehab method, and pipe type. We will need to ensure pipe materials or trenchless technology can sufficiently handle the operating pressures and maximum surge that is anticipated.

The design engineer dictates the minimum cover required for the pipeline, and HDR has recommended the depth of pipeline cover to be a minimum of four feet (42" plus 6" contingency cover) as stated in the 2012 PDR. NDOT does not have any requirements for third-party utilities; they rely on the project design engineer to provide the specific requirements to be included in their roadway designs. Including the minimum cover, pipeline's diameter, and six inches of bedding this will result in a total excavation depth of six feet. **In Granite's opinion, it would be beneficial to keep the total average trench excavation to no more than five feet in depth to avoid the required use of trench shoring or shields.** We are aware that the existing pipeline is installed at a shallower depth based on actual repairs we have performed for IVGID. The recommended minimum trench width is 3.5 feet (per the PDR). We also believe a 3.5-foot trench width is too narrow to provide room for adequate compaction equipment along the sides of the pipe. We recommend the minimum trench width be approximately 4.5 feet wide (diameter of pipe, plus 18 inches on each side) allowing enough room for compaction equipment and/or shoring where necessary. The local region's frost depth needs to be further evaluated by IVGID and the design firm to determine its impacts on pipeline functionality.

NDOT's Culvert Crossings memo, prepared by HDR (dated January 23, 2012) indicates that NDOT standards will require the new pipeline to cross below NDOT drainage culvert pipes, with a minimum clearance of 3 feet. Granite is aware that NDOT has allowed down to a minimum of one foot of separation between culverts and the pipeline on previous projects. At the time of the PDR, 47 NDOT culvert crossings were identified. Seven of those identified were deep crossings (at depths of 13 feet to over 17 feet). HDR included evaluations of added cost for the 7 deeper crossings, with an estimated cost of approximately $272,000 to the project. These deep crossings will also increase the project schedule, reduce worker

safety, and further impact the traveling public. HDR determined that the impact to the project for the remaining 40 crossings does not present a problem meeting NDOT's Standard.

Although additional cost and schedule impacts will need to be analyzed in more detail, **it is Granite's opinion that whenever the new pipeline is required to go underneath culvert crossings (at any depth) and maintain the required 3' separation, there will be cost and schedule impacts to the project.** This requirement will create constructability and logistical challenges which will decrease productivity, increase material costs, and impact IVGID's ability to perform future maintenance.

Granite is also concerned that the information provided may be outdated since additional drainage facilities have been installed from 2016 through 2019 as part of the SR-28 Water Quality Improvements we completed for NDOT.

There are no indications that the existing effluent pipeline, currently located above storm drain culverts, has negatively impacted culvert performance. It is Granite's understanding that IVGID has requested a variance for the 7 deep crossing locations. NDOT requested an engineering analysis to justify this request. It is unclear whether NDOT has received a copy of the memorandum prepared by HDR providing this analysis. It will be prudent to partner with NDOT and continue discussions to further understand their requirement and reach a resolution prior to finalizing design. There may also be some other measures such as encasing the culvert pipe in slurry backfill or installing a protective steel casing around the new effluent pipeline to create separation, which may mitigate NDOT's concerns about placing the pipe above the culverts.

If the new pipeline can remain above the culverts (where depths are not too shallow), this will eliminate or reduce the need for field cutting of pipe and concerns about field applying protective pipe coating, specialized pipe fittings, and air release and blow off assemblies. Our team understands that not all ARV's and BOV's can be eliminated; however, minimizing the number of NDOT culverts that the pipeline would go beneath would reduce the number of ARV's, BOV's and utility covers needed.

Preliminary project plans identify several air release valves (ARV) locations and blow off valves (BOV) along the alignment. It is our understanding that NDOT requires these valves to be located outside of the roadway clear zone. This requirement may not be feasible in all locations due to site topography and limited right of way, so Granite recommends field verification of the planned locations to ensure the best fit.

HDR's 2012 PDR states that NDOT's policy does not allow for isolation (butterfly) valves to be placed within the roadway. However, Granite feels it will be beneficial to install valves at key locations along the alignment to isolate and drain the pipeline as needed to expedite pipeline replacement and/or trenchless rehab. This would minimize future dewatering efforts that might be required to make repairs, especially in the low-lying areas that hold water. Butterfly valves have been used on previous projects and are appropriate for this Project due to the significant impact of a line break and the length of time it takes to complete repairs if large segments of the pipeline cannot be isolated.

Granite recommends meeting with NDOT to further understand their reasoning for not allowing valves to be located within the roadway in hopes we can come to a resolution that meets the needs for both NDOT and IVGID. NDOT recently added several storm-drain manholes within the roadway on SR-28 as part of the Lake Tahoe East Shore Trail Project, indicating that their policies may have been updated. If a resolution cannot be reached, a mitigating solution could be to place valve covers below the pavement surface and GPS as-built survey to provide future access for IVGID while eliminating the concern about snowplows and road maintenance equipment.

In HDR's 2012 PDR, NDOT indicated that they want the existing pipeline to be removed from their ROW. Granite concurs with HDR's analysis that full removal will significantly increase project costs and nearly double the construction duration, while adversely impact the traveling public. There are other means by which the pipe could be abandoned in place such as concrete slurry backfill or sand. There are also new high-density foam applications that may meet this requirement and can be further evaluated. In Granite's experience with IVGID pipeline repair, the existing pipe was not removed from the roadway, nor was it filled with slurry or sand. This will need to be discussed further with NDOT in hopes that we can reach a middle ground. All potential solutions for abandoning the pipe will need to be vetted out during preconstruction.

A pipeline locating system should be installed, allowing for IVGID staff to accurately identify the new pipeline location after the project is completed. Currently, the existing roadway metal guardrail affects the ability to accurately locate the pipeline as it interferes with locating equipment. Granite concurs with HDR's finding in the 2012 PDR, which recommends using a 3M electronic pipe marker ball system in place of a traditional tracer wire system because it provides a cost savings and improved locate ability. The marker ball system can also be placed at individual angle points and pipe joints, making location identification for future maintenance and repairs easier. HDR cost analysis showed tracer wire to be more expensive and would require pull boxes every 1,000 feet, presenting challenges working on narrow shoulders and around guardrail.

Due to the age of the HDR reports and information provided, Granite realizes that some of the current design requirements may be outdated. Future meetings with NDOT will need to take place so that the team can clarify current requirements. NDOT has recently updated their trench-patch detail and may require full-width dense grade paving along with an open grade wearing coarse. In our most recent experience on SR-28 Lake Tahoe East Shore Trail, we modified permit requirements and milled the existing HMA 2 inches and placed 2 inches of dense grade HMA in substitution of a combination of dense and open grade HMA. We also eliminated the slurry cap over the pipeline, further reducing costs and schedule. A discussion will take place with NDOT to work through some of these requirements.

Pipe Materials:
HDR has evaluated three pipe materials, including ductile iron, steel, and fiberglass pipe. They concluded that both steel and ductile iron pipe could be utilized for open cut replacement. Further investigation of the fiberglass pipe would be needed to approve its use on the Project. Due to high operating pressures, we will be limited on suitable pipe materials that can be used on this project.

Granite understands that each pipe material has advantages and disadvantages, which will require thorough evaluation during preconstruction. Evaluations should be based on material availability, costs, constructability, longevity, corrosion resistance, future maintenance costs, and allowable operating pressures.

Ductile Iron
Ductile iron pipe (TR Flex) was used on previous IVGID pipeline repairs Granite completed in 2017. Advantages are high operating pressures, restrained joints, and up to 3-degrees of joint deflection. Standard laying lengths are 18 feet to 20 feet, allowing for easier construction along the tight SR-28 corridor. Installation does not require welding, but field cut ends require mechanical connections and field repairs to the protective pipe coating. Pipe wall thickness will vary depending on the required pressure rating.

Disadvantages to ductile iron pipe include costly fittings required for bends. Additionally, it comes with standard cement mortar lining, which, based on the current pipeline's evaluation of the cement mortar

lining performance at the joints, HDR did not recommend using this type of lining. Lining can also be damaged during construction, potentially reducing the overall pipe life expectancy. HDR recommended that the pipe be double lined with cement mortar or lined with a ceramic epoxy lining material such as Protecto 401. This will result in added material costs (estimated $570,000 in 2012). The pipe should be wrapped with 8-millimeter-thick polyethylene sheets or tubes for additional exterior corrosion protection. Granite recommends additional investigation with suppliers to identify current pipe speciation's, alternatives for protective coatings/linings, and potential solutions to address concerns about future joint degradation. Since the development of the PDR, there may be some improvements on the manufacturing of ductile iron pipe (i.e. improvements in technology, joint construction, QC, etc.). Material will need to be evaluated during design and prior to making a final selection.

Other concerns are gasketed seals which may be a contributing factor to current leaks in the pipeline's low-pressure segments. A potential disadvantage to the bell and spigot joint is future PICA data will be unable to identify pipe wall thickness and leakage at joint locations during future inspections (as stated in current evaluation information). Granite will contact material suppliers to see if advancements in joint seals have been made.

As of 2012, HDR's analysis showed DIP was the most cost-effective option per LF of pipe, but it is difficult to determine actual costs with an unknown number of fittings that significantly increase material and installation costs. HDR provided estimated costs of $88/LF, excluding fittings, which does not reflect current pricing.

Steel Pipe

Steel pipe with welded joints was used to construct the existing pipeline's high-pressure portion and is still commonly used for pressure pipe applications. Some advantages include the pipe's ability to be beveled cut and welded, thereby reducing the number of fittings required. Additionally, longer pipe lengths result in fewer joints and offer O-Ring push-on type or flanged joints options (where applicable), potentially making for easier installation.

Disadvantages include longer laying lengths of 40 feet to 48 feet, increasing logistical challenges working on SR-28. Also, the additional time to weld joints or install harnessed joints for pipe restraints may reduce production. Field applying the protective coating is difficult due to access and would require a 4 inch to 6-inch tee for access. Maximum joint deflection should be kept to 1.75 degrees which may result in additional field cutting and welding or harnessed joints to meet pipe alignment.

Like DIP, there are concerns with cement mortar lined protective coating, and HDR recommends using a polyurethane lining to mitigate corrosion of the pipeline. Linings would need to be applied by an independent coating company, which would require additional shipping costs from the coating company to the jobsite. Steel pipe may also require an exterior coating due to evidence of corrosive soils from the geotechnical report.

Preliminary costs provided by HDR show steel pipe with coating is more expensive than ductile iron pipe. Further investigation of current material costs, manufacturer availability, and coatings needs to be conducted before making any final decision on pipe materials. The preliminary cost of $135 per foot was quoted (2012). This includes the cost of polyurethane lining and coating. There is a limited number of manufacturers in the US, possibly resulting in long lead times and limited supply.

Fiberglass Pipe

Fiberglass pipe has been used in water, and wastewater treatment facilities throughout the US HDR evaluated several pipe manufactures, including Ameron municipal fiberglass pipe, HOBAS pipe, US

Composite Pipe South, Future Pipe, NOV Fiberglass Systems. Of these, Ameron was the only manufacturer that offered a reasonably assuring product named Bondstrand. This information is outdated, and current manufacturers will need to be contacted to obtain information on current products and any new technology that has emerged since 2012.

When comparing steel or DIP to fiberglass pipe, fiberglass advantages include its resistance to corrosion (pipe does not require a protective lining or coating); therefore, there is no need to provide joint bonding for corrosion protection either. Additionally, the pipe is made from solid glass resin (no concern of leaching), and it is lighter weight and easier to work with. Fiberglass pipe uses push-on type O-ring joint (non-restrained joint) or a double-locking-key type joint (restrained joint).

Disadvantages of fiberglass pipe include pipe material degradation, where there is potential the material loses strength over time and loses strength under conditions where there is elevated temperature or sustained contact with a low pH environment. Fiberglass pipe is subject to creep at all temperatures when subjected to stress.

Budget cost $115/LF for restrained, $48/LF for non-restrained (2012), and standard length is 20 feet. There may be additional cost savings with not needing to provide protective sheeting on the pipe's exterior to prevent corrosion.

Other Solutions

Granite recommends all three materials be considered for competitive pricing, but further investigation should be considered for the fiberglass pipe. Current material pricing should also be updated to evaluate the cost of each material.

Additionally, thick-walled HDPE and PVC pipe should be evaluated in the low to mid pressure locations. HDPE and PVC would have fewer issues with corrosion resistance and field cutting and modification concerns. To ensure IVGID is getting the best value, the team should consider all viable pipe types and perform life cycle analysis, including installation costs, longevity, and future maintenance.

Proposed Pipeline Alignment:

The existing effluent pipeline is primarily located within the shoulder of the roadway and creates conflicts with guardrail and roadway signage. HDR's 2012 PDR states that NDOT's current policy requires new utilities to be placed outside of the roadway's paved section where feasible. Since SR-28 is a two-lane road with narrow shoulders, it is not practical to place the new pipeline outside the paved area. The pipeline alignment is recommended in the middle of the southbound lane of SR-28 to facilitate future maintenance. Advantages include the southbound lane is likely constructed of fill, and stresses from traffic loading will be reduced.

Although the southbound lane is a logical alignment, it presents possible construction challenges. As stated by HDR, it is believed that the southbound lane is constructed with fill. However, Granite has encountered large boulders and bedrock within the southbound travel lane on previous projects. Removal of large boulders creates voids and undermining of the adjacent pavement, making it difficult to backfill and requiring additional pavement mitigation. Where solid rock is encountered, additional means for excavation (mechanical or blasting) may be required to install the new pipeline, adding costs and time to the construction schedule. Another concern is the proximity of the trench to the travel way. To ensure public and worker safety, portable concrete barrier rail may be required to protect the open trench. Aside from the added costs of the barrier rail, working around the rail presents constructability challenges which will impact productivity and access to the work zone.

As an alternative, the new pipe may be placed in the existing alignment where viable. This should reduce the risk of encountering rock or subsurface conflicts during excavation and would likely eliminate the need for barrier rail. However, the disadvantage of using the existing pipe trench is the cost and time involved with shutting down, draining, and removing the old pipeline. The current plant capacity for storage is limited which will impact the amount of pipe that can be repaired at one time.

Further geotechnical and field investigation is recommended to identify locations of the new alignment where the probability of encountering bedrock or boulders is likely so that we can effectively evaluate placing the new pipe in the current alignment.

Granite is aware that there have been several discussions as well as preliminary evaluations between IVGID and Tahoe Transportation District (TTD) with regards to the feasibility of co-locating portions of the IVGID pipeline within the future SR-28 Lake Tahoe East Shore Trail alignment. Granite has also been involved in preliminary alignment recommendations for the shared-use path, including walking the proposed alignment with TTD officials and Lumos. While Granite feels that placing the new pipeline in the path may provide potential benefits, further analysis would need to be done to verify preliminary cost savings estimated by IVGID and TTD. It appears the timing of IVGID's pipeline project does not align with the trail's future construction.

Constraints for co-location include coordination with the path in challenging terrain. There is also a possibility that a different contractor could be selected to construct the path, further complicating coordination. Additionally, conversations with TTD have led us to understand that complete funding for the shared use path has not yet been secured, potentially further delaying the shared-use path project. Granite feels that continued evaluation of co-location should be considered. However, it may be in the best interest of the IVGID Project to proceed- with IVGID's proposed pipeline project independently of co-location. As an alternative, the team could consider completing the repairs for the sections of the pipeline that have been deemed not suitable for co-locating which would provide additional time for funding and final design of the shared-use path.

Geotechnical Conditions:

A geotechnical evaluation was performed in 2011, which included 20 borings, 20 seismic refraction surveys, lab testing, and analysis. The boring data concluded that 11 of the borings encountered rock at depths ranging from 3 feet to 10 feet, while 9 of the borings did not encounter rock at depths of 11.5 feet. One boring had low plasticity clay at a depth of 6-feet.

Soils encountered generally consisted of sand with silt and silty sand and decomposed granite, underlain with rock of varying weathering. Preliminary estimates provided by HDR concluded that rock will be encountered within the pipe trench zone along approximately 5% to 10% of the alignment. Based on the preliminary data, HDR has determined that it is unlikely that hard rock will comprise the entire trench volume. Granite has concerns about the engineer's construction cost estimate, assuming only 5% of the trench excavation volume will be hard rock material requiring blasting or other extraordinary removal methods. Based on our previous experience, we have encountered solid rock of varying degree in most of the trenches excavated along SR 28. In 2018, Granite installed 1,000 LF of stormdrain pipe where the trench was comprised entirely of rock. We also believe that blasting may not be feasible or be allowed due to the proximity of the existing pipeline and NDOT requirements on previous projects in the SR-28 corridor. We feel a more realistic assumption is that rock material will need to be removed by mechanical means or by using expansive grouts and hydraulic rock splitters. This can dramatically increase construction costs and time required to install new segments of the pipeline.

Although this will be discussed in more depth during preconstruction, it is difficult to determine the exact extent of the rock to be encountered. Therefore, we suggest that rock removal be allocated to the Risk Register as part of a project contingency budget rather than be included in direct unit costs established for the pipeline. The Risk Register will be developed during preconstruction services and design. Through preconstruction we will work as a team to identify who is best suited to manage the various risks on the project. Rock excavation is a type of risk that is well suited for a risk register (owner contingency) where the risk has been thoroughly evaluated and a reasonable budget has been allocated to account for added costs if the risk is encountered during construction. All risk contingency allocation during construction will be approved by IVGID prior to being used. IVGID retains any remaining funds that are not expended from the risk register at the end of the project.

Based on the geotechnical information provided, much of the onsite fill and native materials that will be encountered during construction would be suitable for use as pipe bedding, initial backfill, or trench backfill, if desired and if allowed by IVGID and NDOT. Some native soils were identified as potentially corrosive and may not be suitable for direct contact with the pipe. The use of such soil as pipe bedding and initial backfill should be evaluated more closely during design and final pipe material selection. Granite reused native material for portions of the backfill on previous IVGID projects, so we concur that native material should be adequate for reuse as backfill for the intermediate backfill zone. Material can be screened to remove any oversized material and be tested and evaluated for potential effects PH may have on pipeline corrosion and steps taken to mitigate during design (i.e., pipe coating and bagging).

Groundwater was encountered at depths from 9 to 10 feet in three borings, while zero groundwater was encountered in the remaining borings. The borings were made in spring and early summer, indicating that similar conditions should exist during the Project's projected construction window.
Granite does not foresee groundwater being a significant issue in most locations based on previous experience and geotechnical information provided. While working on SR-28 Lake Tahoe East Shore Trail, Granite typically encountered water near existing creeks, wetlands, and natural springs. There is a potential to encounter groundwater where pipe depths exceed 9' (deep culvert undercrossing), however we do not anticipate encountering water in the excavation outside of those areas. Granite recommends this be evaluated and costs be placed into the Risk Reserve as a contingency in the event groundwater is encountered.

Granite recommends performing additional borings throughout the six miles of the proposed pipeline alignment, focusing primarily on stretches where bedrock was encountered. We feel that 20 borings over 30,000 LF (1 boring / 1,500 LF) does not provide sufficient information, and additional data is needed between borings to accurately evaluate the extent of hard rock that will be encountered.

Existing Utilities:
The only known existing utilities within the project alignment include IVGID's pipeline and NDOT storm drain culverts. The pipeline is generally located under the fog line on the west shoulder of SR-28. The curved sections of the pipeline are likely to veer into the roadway or further out of the shoulder. Since most of the original pipeline was constructed by deflecting joints and not using fittings, there is a potential for conflicts in the field with the new pipe alignment. There appear to be discrepancies with the as-built drawings, and concerns exist about their accuracy.

During construction, if we cannot maintain adequate spacing from the old pipe while installing the new one, a risk of a blowout exists. We would identify these locations (if any) and plan a scheduled shutdown to complete the new pipe installation. Pipeline shutdowns would only be necessary if other means for securing the existing pipe are not feasible. This may require more than one shutdown, depending on the

length of pipe being replaced. We recommend additional field investigation be done during preconstruction to verify alignment conflicts prior to finalizing the design. This can be accomplished using Ground Penetrating Radar (GPR), a non-intrusive method used to determine the pipe's location and depth. In places where guardrail interferes with the ability to use GPR, potholing will be necessary to locate the pipe. These costs will be further defined once necessary field investigation scope is defined.
Granite believes this added cost will help minimize risk and increase cost savings for the overall Project.

Connection to Existing Pipeline:
HDR identified two locations where permanent connections will need to be made to the existing; one will be at Spooner Pump Station and the other at Segment 3 north. Information says the stub out was constructed in 2006, so it would need to be field verified during preconstruction.

At the end of each season, there will be an option to make a temporary connection between the new pipe and the existing or to cap the pipe and leave it non-operational. A major advantage of connecting the new pipe and putting it into service is that it will eliminate the old pipe's potential failure. There would be additional costs to include temporary connections, and the cost/benefit should be evaluated during preconstruction. This will require shutting down and draining the system. Granite has encountered challenges with dewatering the existing pipeline on previous projects due to the lack of isolation valves, faulty BOV and ARVs, and the short window for shutting down the line. Some of these challenges can be mitigated by installing isolation valves, establishing dewatering points, and completing the pond lining to allow for additional effluent storage.

Permitting:
Permitting is a crucial part of the successful implementation of the Project. Similar permit conditions for NDOT and TRPA can be expected as required on previous projects of similar scope in the Lake Tahoe Basin. We see the permits grouped into two categories: environmental and NDOT permits.

Environmental permits requiring submittal include TRPA, NDEP, and other state and local entities. During preconstruction, we will work with IVGID and the design team to identify and develop a permit matrix of all required permits. Granite will support and leverage our relationships to expedite the procurement of any necessary environmental permits. TRPA grading season only allows work requiring excavation to be completed between May 1st and October 15th each year. On previous projects, Granite has been able to work from about mid-April to mid-November (weather dependent). In 2017, we worked through December 10th on critical pipeline repairs, so there may be some flexibility if TRPA deems not completing repairs presents more of a detriment than the excavation.

Granite is aware that HDR met with NDOT to discuss the Project and gather input on this Project's permit conditions prior to finalizing the PDR. Based on the information provided to Granite, permit conditions required by NDOT will be like those on previous projects performed by IVGID on SR 28. . These restrictions limit the lane closure length and the amount of time allowed to work with a closure. Current assumptions derived from HDR's 2012 PDR are that work will only occur in May and June (prior to the busy summer season). Given the quantity of pipe that will need to be replaced or lined, this extends the schedule out over several seasons (up to 5 years).

IVGID has requested that NDOT consider relaxing the 2,000-foot work zone limitation and allow work zones of up to 3,000 feet. NDOT may consider this request upon IVGID providing supporting analysis. A traffic count and delays report were performed, and the findings are available in (Tech Memo 2, Appendix A). Appendix D also includes work zone restriction analysis on pages 170 – 186.

Granite's approach of engaging agency representatives early and throughout the planning and permitting process is critical to regulatory collaboration and compliance. We recommend partnering with NDOT and TRPA early in the design phase to establish a cohesive partnership, helping to minimize past obstacles encountered by IVGID. With the team-driven nature of CMAR, partnering will be a crucial portion of the preconstruction and construction process and serves as a platform for innovation and collaboration. CMAR relies on facilitated formal partnering to maintain alignment with IVGID and other stakeholders throughout the Project. Through partnering, Granite will continue to cultivate and strengthen our established relationships with partners, including IVGID, NDOT, TRPA, TTD, Nevada State Parks, NDEP, and others. Through close collaboration with IVGID and the stakeholders, we will reach all the project goals using our combined resources to solve issues and resolve potential risks.

Repairs deemed critical requiring immediate attention can be performed under IVGID's MOU with TRPA. A right-of-way permit and a submittal of roadway repair materials would be required by the NDOT permit as well. This timeframe may also allow for potholing or investigation of the existing pipeline.

Additionally, Granite proposes the following changes to NDOT permit conditions:

- 20-to 30-minute delay
- 3,000-foot lane closure
- Double- shifting work activities
- Sunday night through Friday afternoon work week
- Possible Saturday work in the Off-Peak Season
- Shorten the lane closure from June 30 through September 6 during daytime hours (to 2,000 feet if needed so work could be performed during those months)

Although it was not mentioned in the information provided, NDOT may require the use of precast barrier rail. If this is required, production rates will reduce considerably and increase overall project duration and costs.

Traffic Analysis & Impacts:

Based on Granite's previous project experience while working on SR-28, we agree with HDR that a 3,000-foot lane closure will not increase delays when compared to a 2,000-foot closure. The length may need to be adjusted at specific locations due to curves in the road and line-of-site for the flagging personnel. Granite recommends that traffic control limitations be broken down into two seasons and night work. The first being the Off-Peak Season (May 1st to mid-June and Labor Day to October 15th), and the second being Peak Season (mid-June through Labor Day). During previous NDOT projects, we had day-time lane closures during the Off-Peak Season up to 2 miles and ½ mile during the Peak Season with minimal delays. We also determined that night-time closures from 8 PM to 6 AM up to 3 miles could be maintained while meeting NDOT maximum delay requirements.

Traffic control needs for trenchless and open cut replacement are similar in the minimum requirements necessary in time and length of closures. Granite would need to excavate, place and backfill the pipe and pave the roadway within the 3,000-foot closure for open cut replacement prior to moving to the next section of pipe. In the trenchless method, we would have an open pit and a closing pit within 1,000 feet to 2,000 feet of each other and our equipment within the 3,000-foot closure.

In reviewing the traffic survey information from 2004 and based on previous experience,
Granite is optimistic that NDOT will be flexible toward extending closure lengths and work seasons. We recommend reviewing more current traffic counts and working with NDOT on developing the most efficient traffic management plan balancing production with the traffic plan's impacts. A contingency plan should be developed if delay times cannot be met.

Under NDOT's current paving contract # 3858 SR-28/SR-431 Project, it is indicated that NDOT has allowed working days that could extend the Project into June 2023. The scope of work includes completing roadwork on SR-28 west of Lakeshore Drive, as well as sections west of Sand Harbor and at Marlette Creek. Granite will collaborate with NDOT during this project and their contractor to coordinate traffic control efforts. This will most likely be included in NDOT permitting and would be a partnering topic for further discussion. Impacts on traffic will vary along SR-28 depending on proximity to popular destinations along the east shore. Lane closures and working times may need to be adjusted when working closer to Sand Harbor, etc. This will require coordination with State Parks, USFS, emergency responders, and others.

Summary of Project Implementation:
Previous pipeline projects have had stringent permit restrictions from NDOT and TRPA. This is a driving factor in the construction duration, expecting to take 3 to 5 seasons to complete. Other contributing factors will be methods to abandon the existing pipeline and installing a new pipeline underneath NDOT storm drain culverts, and a short working season. Production rates for open cut replacement need to be further evaluated, considering NDOT restrictions and design requirements.

Construction sequencing should be planned in a linear fashion to minimize the amount of field cutting of pipe, avoiding concerns with proper field installation of the protective lining. A detailed pipe layout based on the design alignment should be part of the submittal process so that all joints, fittings, and field cutting can be identified prior to construction. We also recommend having extra pipe, fittings, and other spare parts readily available onsite to avoid field delays and be prepared for emergency response. Materials not used in construction will be given to IVGID for future use.

Evaluating the risk of rock removal that may be required in a new pipe alignment should be analyzed through further geotechnical investigation so that cost and time impacts can be accurately assessed. In some pipeline replacement segments where it is believed extensive rock may be encountered, it may be more economically constructible to replace the pipeline in the current alignment. Other considerations should include impacts to traffic, working hours, and the overall duration of the Project.

Much of the evaluation performed on this Project revolves around the open cut method for full pipeline replacement. While we agree that this may be the only option for certain segments of the pipeline due to high pressures, further evaluation is needed on the viability of using trenchless technology for pipe rehabilitation in segments of lower pressure. Once a more in-depth analysis can be completed on existing pipeline pressures, we can look at individual sections to see if there are lining technologies that could be utilized. Pipe pressure data could also be utilized to evaluate alternate pipeline materials, such as thick-walled HDPE and PVC.

At the time of development in the PDR in 2012, pressure pipe rehabilitation options for the pressures outlined in the report were limited and/or emerging technologies and, therefore, difficult to consider as viable options. There have been notable advancements in the pressure pipe rehabilitation industry since then. The PICA inspection in 2015 provided considerable detail on the internal condition (ref. HDR assessment and technical memos in 2016 and 2019).

The survey identifies a consistent fluctuation in wall thickness based on numerous pipe types used during construction. The survey does not provide a 'measured' internal diameter; however, the pipe type and wall thickness will aid in technology and method selection. This will require a limited number of potholing excavations to complete site field investigations during design. It will be important to access the pipe at specific locations during preconstruction to evaluate the cleaning effort required for any trenchless technology application properly repaired as determined by the design engineer.

The as-builts indicate a maximum deflection of 2.5 degrees, and trenchless technology applications for these pressures typically have a 2 to 3-degree maximum; therefore, confirming alignment deflection through modeling will be critical to determine which sections of this pipeline may be at or exceeding those potential limitations. Defined angle points or mitered/factory bends will be considered as fixed excavation access points where trenchless installation is applicable. We will need to confirm the hydraulic grade line, surge pressure, and verify design assumptions during the design phase.

The current pipeline has pressures up to 440 psi; the export pipeline should be modeled to provide greater detail on the actual pressures throughout the alignment to assist with evaluating suitable repair methods, including trenchless technologies, rather than establishing a higher-pressure requirement (accommodating surge and testing) for an extended range of use when it may not be necessary (one size does not fit all). In addition to better understanding the pressures, additional detail regarding vacuum pressure is also necessary.

In addition, Granite recommends that the accuracy of horizontal and vertical alignment be field verified. It will also be necessary to confirm the level of deflection used throughout the alignment to accurately evaluate trenchless technology feasibility. We recommend performing CCTV inspections during preconstruction services to collect data on pipe interior diameter, determine cleaning requirements, and assess the amount of shutdown time we will have to effectively plan our construction efforts. Temporary shutdown is required to perform these scopes of work, along with determining viable access points.

Further discussion with the design team during preconstruction will be necessary to evaluate the pipe's structural integrity before determining a trenchless technology solution. However, based on the information provided to date, Granite Inline suggests CIPP, Kevlar liner, and potentially slip lining (based on investigation) in lieu of pipe bursting. Refer to Table 1 for potential trenchless technology solutions.

Table 1

	Max Operating Pressure (psi)	Max Install Length (ft) subject to design	AWWA Class	PROS	CONS
Pipelining Methods					
UV-Cured CIPP	263 psi	1,000LF	IV	Pull-in-place (rather than inverting to install) & Higher Pressure Rating & improved field production	Pressure Limit
Heat Cured CIPP	165 psi	1,000LF	IV	Potentially Longer Lengths	Pressure Limit, On-Site Wetout
Double-Layer Kevlar Pressure Liner	464 psi	2,000LF	Class IV Internal Pressure & and Class II for External Loading	Expedited installation, no chemicals (resin), spans a longer distance and high-pressure rating	Cannot take external loading (non-structural). Emerging technology.
Close Fit Slip-Lining	Subject to Host Pipe to optimize capacity	2,000LF & Longer (subject to alignment)	III	Longer reaches if alignment allows. No chemicals (resin)	Relies on host pipe for internal pressure and external loading. Polyethylene pipe requires welding above ground prior to install (traffic impact). Larger access pits.

Summary of Recommendations:

1. Select Designer: Granite has been asked to provide IVGID with designer selection input. We believe it is imperative to hire a firm that is open to new ideas and willing to exploring innovative solutions. They should have a local presence while exhibiting working knowledge of NDOT, TRPA, and other regulatory agencies. The design firm should be willing to collaborate while maximizing CMAR process benefits, as well as understand risk and have a willingness to develop solutions to mitigate those risks.

Granite feels that HDR meets the criteria above and is familiar with the Project resulting in overall cost and schedule savings. HDR is a national firm with a local presence with sufficient resources and expertise necessary to execute the design effectively. Their design team should have current knowledge of pipeline technology and be willing to bring the appropriate personnel on board to provide their technical expertise.

2. Partnering Meeting: Granite recommends a kickoff partnering meeting with Granite, IVGID, and the design firm selected to develop a collaborative partnership key to the CMAR approach. It will also provide an opportunity to involve key stakeholders (NDOT, TRPA, NDEP) in the process, which should provide benefits throughout the project lifecycle.

3. Develop Design and Permitting Timeline: Granite recommends incorporating design timeline into preconstruction schedule. Work with NDOT to understand permits and expand our work window, lane closure restrictions, and negotiate permitting requirements to reduce cost and schedule. Additionally, work with environmental agencies to identify and procure necessary permits.

4. Identify Pipeline First Order of Work Areas: Granite recommends identifying critical repair areas and address those as soon as possible. Use the information obtained through preconstruction to develop project phasing plan and detailed construction schedule for the multi-year project.

5. Complete Additional Field Investigation:
Granite recommends performing additional geotechnical and field investigations (potholing) to confirm current and future alignments (pipe ID, true as-builts, angle points, deflections, etc.). It will be necessary to verify actual pipe pressures vs. current design information to evaluate trenchless technology alternatives and identify pipe replacement materials.

6. Preliminary Cost Estimates: Granite recommends providing and analyzing multiple preliminary cost estimates based on the preferred design alternatives to select best-for-project cost, identify schedule impacts, and value. These would include preliminary cost estimates for varying pipe materials and methods for trenchless technology alternatives, as well as selecting best value pipe materials for open cut methods.

EXHIBIT B

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Date: Friday, April 30, 2021

To: Nathan Chorey, Engineering Manager, IVGID

From: Brian Roll, Project Director
John O'Day, Project Manager
Cody Cummings, Preconstruction Services Manager
Keith Oxner, Rehabilitation Technology Expert, Granite Inliner
Jason Walborn, Director of Business Development, Granite Inliner

RE: **CMAR Pre-Construction Services**
Task 2, Item C – Findings Memorandum for Pond Lining

General:
This memorandum summarizes the results of Granite's preliminary evaluation of the background material for the IVGID Pond Lining portion of the project. Scope of work includes lining a 2.4-million-gallon pond along with upgrades to existing plant facilities, including electrical, valving, and perimeter fencing for the pond. This memorandum identifies additional information we believe is necessary to; complete the project design, evaluate various pond lining methods, provide accurate construction costs, and develop a project construction schedule.

Background Information:
Informational sources were evaluated in the development of this memorandum and are listed below. This list is not all-inclusive of this project's information but represents the most relevant background information reviewed.

- Water Resource Reclamation Facility (WRRF) Effluent Storage Alternative Analysis, prepared by Jacobs Engineering, dated September 2018.
- IVGID 2/26/2020 Board Meeting General Business Item G.1. Authorize a Professional Services Agreement with Jacobs Engineering for the Effluent Pond Lining.

Project Information:
Current effluent storage capacity is estimated to be between 16 and 44 hours, depending on the season (high flow vs. low flow). The newly lined pond's added capacity will provide between 38 and 77 additional hours of effluent storage during pipeline shutdowns, making it critical to complete the pond lining before beginning significant repairs to the pipeline. The pond's additional storage capacity will allow for longer pipeline shutdown periods, which will be key for portions of the pipeline where trenchless technology is used for rehabilitation. Additional storage will also be needed to accommodate where new pipe is placed in the same alignment as the existing or where conflicts arise between the new and existing pipe alignments. Temporary shutdowns of the pipeline will be necessary to complete tie-ins at Spooner Pump Station and the end of each season on segments 2 and 3.

Granite recommends that the pond be the first order of work since it will be used for storage during pipeline construction. We also recommend Jacobs as the lead design engineer for the pond due to the

firm's familiarity with IVGID plant operations, preliminary design, and costs analysis they have completed to date. Selecting Jacob's would eliminate the need to familiarize a new designer with the project scope and permitting requirements.

Permitting:
Once a design firm is selected, Granite will assist with developing the design schedule to determine necessary advancements to achieve critical project milestones. Expedited design and permitting for the pond lining will be required to meet the aggressive construction schedule of completing the pipeline repairs over the next three seasons. If pond construction starts in 2022, this means that the pipeline repairs will take place over three seasons 2023, 2024, and 2025. The design and permitting timelines stated within the documents reviewed are concerning provided the immediate need to make repairs to portions of the pipeline. It was estimated by Jacobs (WRRF memo dated September 28, 2018) that it would require approximately 10 months to complete the design and obtain permits. Permits for the pond lining will need to be acquired from both the Nevada Division of Environmental Protection (NDEP) and Tahoe Regional Planning Agency (TRPA) before starting construction. Permit requirements may dictate some aspects of the final design for the pond lining.

Based on this preliminary information, it is likely not be feasible to construct the pond lining in 2021. TRPA grading season (May 1 to October 15) will also dictate our ability to complete this work in 2021. Granite feels a realistic expectation is to start pond lining construction in May of 2022 and have it completed as soon as possible.

Project Implementation:
For potential pond lining solutions, Jacobs evaluated six options: 1) HDPE Lining 2) Concrete Lining 3) Concrete/Shotcrete combination lining 4) Concrete Basin with Vertical Walls 5) Single Enclosed Tank, and 6) Multiple Enclosed Tanks.

Based on Jacobs' preliminary design and cost information, Granite feels the two most viable options include Option 1) HDPE lining and Option 3) Concrete/Shotcrete Combination lining. Jacobs determined the concrete basin with vertical walls and the multiple enclosed tanks were cost-prohibitive, and therefore further evaluation was not performed.

The HDPE lining benefits appear to require the least initial capital investment and the shortest construction schedule. Disadvantages include HDPE's shorter life expectancy, its susceptibility to damage, and that it may create weak points at the interface with the access road and decant facility. This lining method may provide a quicker turnaround on securing the necessary permits due to the simplicity of design and construction. A complete cost benefit analysis should be performed to determine its overall value.

The Concrete/Shotcrete combination provides a longer lifespan compared to that of an HDPE lined solution. However, this option will require a higher initial capital investment and a longer construction duration due to placement of forms, reinforcement steel, and curing times. There will be additional costs associated with placing control joints and sealant to minimize cracking and leaking. Concrete/Shotcrete lining is more prone to leakage, which could increase future maintenance costs. Surface could be sealed to help assist with seepage and leakage through the concrete/shotcrete.

The major advantage of using shotcrete for the pond's side slopes would be the method for placement vs. traditional sloped concrete. Shotcrete is applied pneumatically by hose and shot on the surface. This may reduce costs and time compared to traditional concrete that will need to be formed and poured in stages. Additionally, traditional concrete will need additional cure time needed between placement sections to avoid shrinkage and future cracking.

Jacobs performed preliminary design and costs estimates in 2018. These may not reflect the current construction costs and/or material solutions available in today's market. In order to ensure IVGID is getting the best value, we recommend that during preconstruction, Granite and Jacobs complete preliminary cost estimates for both the HDPE and concrete/shotcrete lined options. This will allow the team to vet out the pros and cons of the initial cost investment, lifecycle analysis, and maintenance of each option to determine the best value for IVGID and its stakeholders.

Summary of Recommendations:

1. Select Designer: While addressed above, Granite recommends Jacobs as the lead design engineer for the pond due to the firm's familiarity with IVGID plant operations. Selecting Jacob's would eliminate the need to familiarize a new designer with the project specifications. Granite has an established working relationship with Jacobs, having previously collaborated on the SR-28 Lake Tahoe East Shore Trail and SouthEast Connector CMARs.

2. Partnering Meeting: The kickoff partnering meeting will allow Granite, IVGID, and Jacobs to develop a collaborative partnership key to the CMAR approach. Through partnering, Granite will continue to cultivate and strengthen our established relationships with partners, including IVGID, TRPA, and NDEP, and others. Through close collaboration with IVGID and the stakeholders, we will achieve project goals using our combined resources to solve issues and resolve potential risks.

3. Design and Permitting Timeline: Incorporate design timeline into preconstruction schedule. Identification and procurement of environmental permits concurrent with design. Identify long lead materials that need to be procured during preconstruction to avoid delays during the construction phase.

4. Identify Critical Path Activities: Use information obtained to develop project phasing plan and detailed construction schedule for the most efficient use of time.

5. Preliminary Cost Estimates: This includes preliminary cost estimates for varying materials for pond lining. Evaluate best lining solution based on initial capital investment, lifespan, and future maintenance. This will allow the team to make a final lining selection and move forward on design and permitting.

EXHIBIT C

INCLINE VILLAGE
GENERAL IMPROVEMENT DISTRICT

Project Summary

Project Number:	2524SS1010
Title:	Effluent Pipeline Project
Project Type:	B - Major Projects - Existing Facilities
Division:	24 - Transmission
Budget Year:	2021
Finance Option:	
Asset Type:	SS - Sewer System
Active:	Yes

Project Description

The Effluent Pipeline Project will be a multi-year pipe replacement project. The immediate priority is to replace all of the remaining Segment 3 pipeline (12,385 linear feet) and to make immediate repairs to the Segment 2 pipeline (17,314 linear feet) to extend its life and avoid future leaks. The project timeline is to accomplish this over multiple construction seasons. TRPA and NDOT permits typically prohibit SR 28 traffic control delays from July 1 to September 5. This limits construction to May, June and Sept 6 to Oct 15. The replacement of Segment 3 would occur over two construction seasons. Replacing segment 2 would require 3 construction seasons. Reapirs to segment 2 could be accomplished with a segment 3 construction phase.

Project Internal Staff

The engineering division will support this project. Outside consultants will be used for design and management. The project will be publicly advertised in accordance with NRS 338.

Project Justification

The District currently owns, operates and maintains a 21-mile pipeline that exports treated wastewater effluent out of the Lake Tahoe Basin. This pipeline was installed in 1970 as part of the regional effort to protect Lake Tahoe's water quality by requiring all wastewater effluent to be exported out of the basin. Within the Tahoe Basin, this pipe is divided into three segments. Segment 1 is the low-pressure supply pipe to the pump station near Sand Harbor. Segment 2 is the welded steel high-pressure discharge pipe exiting the pump station. Segment 3 is the remaining low pressure jointed steel transmission pipeline within the Tahoe Basin running south to Spooner Summit. Segment 4 is the pipe that carries the effluent down the east side of the Carson Range from Spooner Summit to Hwy 395. Segment 5 is the pipeline that extends from HWY 395 to the bank of the Carson River. Segment 6 is the pipeline from the Carson River that delivers the effluent to the IVGID Wetlands Disposal Facility and was installed in 1983. A condition assessment completed on Segments 2 and 3 confirmed pipe deficiencies.

Forecast

Budget Year	Total Expense	Total Revenue	Difference
2021			
Internal Services	100,000	0	100,000
Project Design and Construction Costs	1,900,000	0	1,900,000
Year Total	2,000,000	0	2,000,000
2022			
Internal Services	100,000	0	100,000
Project Design and Construction Costs	1,900,000	0	1,900,000
Year Total	2,000,000	0	2,000,000
2023			
Internal Services	100,000	0	100,000
Project Design and Construction Costs	1,900,000	0	1,900,000
Year Total	2,000,000	0	2,000,000
2024			
Internal Services	100,000	0	100,000
Project Design and Construction Costs	1,900,000	0	1,900,000
Year Total	2,000,000	0	2,000,000
2025			
Internal Services	100,000	0	100,000
Project Design and Construction Costs	1,900,000	0	1,900,000
Year Total	2,000,000	0	2,000,000
	10,000,000	**0**	**10,000,000**

Year Identified	Start Date	Est. Completion Date	Manager	Project Partner

2012	Jul 1, 2020	Jun 30, 2025	Engineering Manager	