To: Mayor and Council
From: Katie Sickles
Date: May 7, 2025
Agenda Item: Tank 2 HDR Engineering DRAFT Evaluation and Memo

---

INFRASTRUCTURE PROJECT:

Tank #2 / Steel Bolted Tank repairs – work with HDR Engineering and Minturn's water treatment plant operator, John Volk, to execute the repairs necessary to rehabilitate Minturn's water tank #2.

PROJECT:

The evaluation attached identifies several

1. Alternative a) No Action or Do Nothing is the recommended short-term approach. Operate tank 2 until the Town determines they can no longer operate the tank. Once Tank 2 is offline the additional volume that can't be used by Tank 3 will now be usable, offsetting the storage loss to the system. This would be prior to any PRV, or control structures set in place between Tank 2 and Tank 3.
2. If not already, begin planning and saving for a new tank within the next 5 years.
3. If applicable, the money allocated for a tank liner/bladder system or tank rehabilitation be saved for a new tank or used for other infrastructure improvements as seen fit by the Town.
4. Seek and apply for funding for a new tank construction.
5. Alternate e), construction of a new bolted or welded steel tank is the recommended alternative to address Tank 2 deficiencies and CDPHE violations. Construct a new bolted or welded steel tank is recommended over install a liner/bladder system, plural component liner, and tank rehabilitation alternatives.
6. Alternate f) construction of a new concrete tank should not be ruled out immediately, unless time is of the essence. Due to funding cycles, there may be enough time to consider tank alternatives in more detail. A concrete tank will take more planning and constructing further out into the future than the other tanks, but the long-term savings potential and minimal maintenance requirements need strong consideration.

RECOMMENDATION:

The proposed action is #1 or Alternative a No action with #2 start planning and saving for a new tank.

RISKS:

The new tank located at the WTP can provide adequate storage for the Town of Minturn. However, there is a major downside if the Town must take Tank 2 offline. If a repair to the distribution system is required from the WTP to Mann Avenue the entire town could be out of water. There is one loop from 1031 Main to 811

Main. If a repair is required in that area, we can send water through the 6" line on the East side of Hwy 24. If repairs are made outside of this area the entire town is out of water.

IMMEDIATE ACTION:
John Volk was advised of the 3-year sanitary survey with CDPHE last week. CDPHE issued a significant deficiency for the leaking bolted tank. The inspector directed the Town to address it.

A 5-year comprehensive inspection is due this year. John can have the divers patch the leaks with epoxy from inside the tank. This was done in 2020, but leaks developed after about 8 months. This is not a permanent fix but will buy a time until the next inspection.

The cost is about $5,000 and I directed John to proceed with this maintenance project.

STRATEGIC PLAN ALIGNMENT:
Town of Minturn Strategic Plan 2025-2027
• Vision: To ensure Minturn's future as a neighborly mountain community.
• Mission: Manage Minturn's growth, including water infrastructure and affordable housing for locals while remaining environmentally & fiscally sustainable.
• Values: Integrity, Transparency, Collaboration & Resourcefulness
• Infrastructure & Services: Repair Tank #2 ~~& PRV Housing Construction~~

RECOMMENDED ACTION OR PROPOSED MOTION:
Town Council is asked to review the documents and motion:

A. Propose action #1 or Alternative a <u>No action</u>

B. Direct staff to insert a new tank within the proposed Capital Improvement Plan with plans to save adequate funds or grant matching funds for a new tank prior to the year 2030.

ATTACHMENTS:
DRAFT HDR Engineering Evaluation Memo

Town of Minturn, CO

Tank No. 2 Review and Construction Alternatives

April 11, 2025

TECHNICAL MEMORANDUM PREPARED FOR THE TOWN OF MINTURN, CO

Introduction

HDR is working with the Town of Minturn to review rehabilitation alternatives for Tank number 2. Tank 2, a “chime” style bolted tank, was constructed in 1996 with a capacity of 600,000 gallons. Approximately 1/3 (8 ft) of the tank is below grade and constructed out of concrete as a part of the tank stem wall foundation and ring wall. The remaining 2/3 (16 ft) of the tank is the bolted steel portion and is above grade. The tanks diameter is approximately 66’ with a 24’ overall tank height or 16’ from ground level. **Figure 1** shows an example of a chime style tank. The horizontal flange seams can be seen at each stacked panel and are the weakest spots of the tank that often result in leaking, as is the case with Minturn’s Tank 2.

Figure 1. Chime Panel Bolted Tank

The Town of Minturn is most interested in having a bladder system installed to the existing tank. The bladder system is reviewed in this memorandum along with other alternative rehabilitation methods ranging from a full tank rehabilitation to demolishing and constructing a new tank. Cost estimates and considerations for all alternatives reviewed are provided.

Tank 2 Condition Assessment and Site Review

The existing coating system in Tank 2 is unknown but is assumed to be epoxy-based. At nearly 30 years old, Tank 2 is approaching the end of its useful life. The tank is showing wear, corrosion, and degradation in all areas of the tank. The worst of the corrosion exists in the interior of the roof structure as this is the tanks condensation zone, where chlorinated water evaporates and creates a corrosive atmosphere inside the tank.

Tank Condition Assessment

The tank condition assessment is based off the prior inspection report dated June 3rd, 2019 with the understanding that little to no improvements were made to the tank since the 2019 report.

Tank Interior

The tank interior is in the worst condition of the tank overall and requires the most attention. Because the tank interior is in contact with fluctuating water levels and condensation exposure, tank interiors are the most prone to degradation or corrosion. In cold climates such as Minturn, fluctuating water levels with ice build up only compounds the corrosion and the interior tank degradation.

The roof design is such that there is a void between the roof panels and the main roof beams. This void is prone to condensation build up and is difficult or nearly impossible to access for repairs. Upon speaking with multiple tank manufacturers, all have stressed concerns over the void between the beams and the roof as well as the center pole support. Failing interior beams and the void have caused parts of the roof surfaces to warp or sag. Contractors were generally unwilling to provide a quote for tank rehabilitation due to the risk associated with trying to repair the roof structure. New roof construction is likely the best solution rather than trying to rehabilitate the existing roof structure.

Tank 2's interior side walls appear to be in the expected condition for the tank age. The condition would be labeled as poor to fair. Vertical streaks of rust can be seen and are due to spot defects in the tanks coating system. The spots may have formed from not preparing the metal and applying primer and coating system properly, and/or oil/grease from paint crews' hands or tools used during construction. A fingerprint on a bare metal surface or primed surface prior to coating is enough to cause a future defect in the tanks coating. If the coating was not applied in the proper thickness, allowed proper cure time or temperature and humidity conditions these defects can also surface. These defects are formally known as "holidays". The vertical rust streaks are caused by the fluctuating tank levels as the water goes above and below the holidays or rust spots.

Tank 2's concrete stem wall foundation interior condition is relatively unknown as there is the limited information available. The condition of the concrete is expected to be fair to good, and any cracks or voids likely can be fixed. Input from the Town of Minturn indicates that gasket and sealant material has degraded into small clumps, or black deposits, and settled out at the bottom of the tank. This is typical in tanks using gaskets and sealants and though it can negatively affect water quality, it will not affect the concrete's integrity.

The tanks overflow weir box is interior to the tank and does not meet the Colorado Department of Public Health and Environment (CDHPE) requirements for freeboard over the top of the weir box and the roof. The dimension needs to be 12 inches minimum, and the current measurement is roughly 6 inches, thus the top of the weir box needs to be lowered by a minimum of 6 inches. The top penetration of the overflow pipe is roughly 9.5 inches and would likely need to be modified in conjunction with the weir box. If left as is there would be roughly 3.5 inches of the

DRAFT

12-inch overflow pipe that would not be used when the tank is overflowing, thus will have a minor impact on overflow rate.

Access into the interior of the tank is not flush with the top of the concrete making access more difficult. Forklifts can typically be brought in to bolted tanks when the tank bottom is flush with the top of the foundation. The forklifts are used to work on the interior roof portions of the tank and upper portions of sidewalls. Panels can be unbolted and temporary shoring set in place on the tank structure and then equipment brought in for interior repairs. Due to the tank's construction being partially below ground, bringing in a forklift or other equipment is unlikely or impossible, in turn making rehabilitation more difficult. Access through the manway is also difficult as there is a nine- or ten-foot drop into the tank bottom.

Tank Exterior

The tank exterior is in as-expected condition and would generally be considered fair. This includes the tank side walls, shell manway, and overflow pipe. Exterior modifications would be required to the overflow pipe to meet current CDPHE regulations. The aluminum ladder is noted to be in good condition.

In addition to the overflow pipe modifications discussed in the tank interior section, the overflow discharge has recommended improvements. The current overflow discharge appears to be mostly buried, or minimally exposed. There is no discharge channel or erosion control currently in place at the outlet. A concrete splash pad with riprap or at minimum a swale made with rip rap to control overflow discharges is recommended.

The existing roof vent and hatch are not in compliance with most current CDPHE requirements and will require modifications. These are relatively easy modifications to make as there are vents that tank manufacturers provide for tank rehabilitation. The selected vent would be frost free and have a stainless steel mesh sized per CDPHE requirements to act as a bug and debris screen.

When the tank level drops, air is brought in, so a vacuum pressure doesn't develop inside the tank. With enough vacuum pressure, the tank can buckle like a pop can. The same is true when the tank water level rises, air is pushed out of the tank so a positive pressure does not develop in the tank which would result in blowing out gaskets, sealant, and other parts of the tank. A frost-free vent is critical for tanks that experience cold weather conditions to ensure air movement is occurring as the tank water level fluctuates.

The hatch is also relatively easy to fix and there are many options to choose from. A Bilco style hatch (example provided in Figure 2) is recommended, and may be required, if any tank rehabilitation work is conducted. These are premanufactured hatches that are affordable and easy to implement into existing tanks. To modify the tank for a new hatch, a flange would be cut and welded into the tank roof and made to accept the manufactured hatch. The height of the flange would be minimum height per CDPHE requirements. These hatches can be furnished with pad locks. If a new tank were to be constructed, a Bilco style hatch is recommended versus a custom fabricated hatch.

DRAFT

Figure 2. Premanufactured Bilco Hatch Example

The concrete stem wall foundation exterior condition is relatively unknown, but leaks are evident around the lower portion of the tank at the interaction of the tank steel structure and the stem wall foundation. Having the lower flange cast into the concrete is a unique design for a chime tank. This interaction style and the 8-foot lower portion being concrete makes rehabilitating Tank 2 more difficult. Based on photos from the 2019 condition assessment, a white substance is observable along the exterior perimeter of the tank at the stem wall foundation and embedded steel flange. This white substance could be calcium deposits being secreted from the soil bentonite seal that is acting as a water stop between the tank concrete stem wall foundation and embedded steel tank flange.

Deterioration of the bentonite seal continues over time, but unfortunately it is not possible to repair as it is encased in concrete. Sealant can be used on the interior and exterior of the seam between concrete and metal flange; however, over time the sealant will be penetrated due to interior and exterior conditions and ultimately leak again. The use of a bentonite seal in Tank 2 is not certain, but was a typical method of construction used in the 1990s and so is assumed.

Tank Construction Site Review

Existing tank construction sites where HDR has direct experience were reviewed along with new construction projects to determine the space recommended for rehabilitation alternatives. At least one acre is recommended for a single tank with a diameter of roughly 60 feet. Most of this space allows for a general approach or driveway into the tank site and staging space for parking and storing materials for a full tank rehabilitation. Figure 3 shows a spatial reference of 1 acre around the existing tank site.

DRAFT

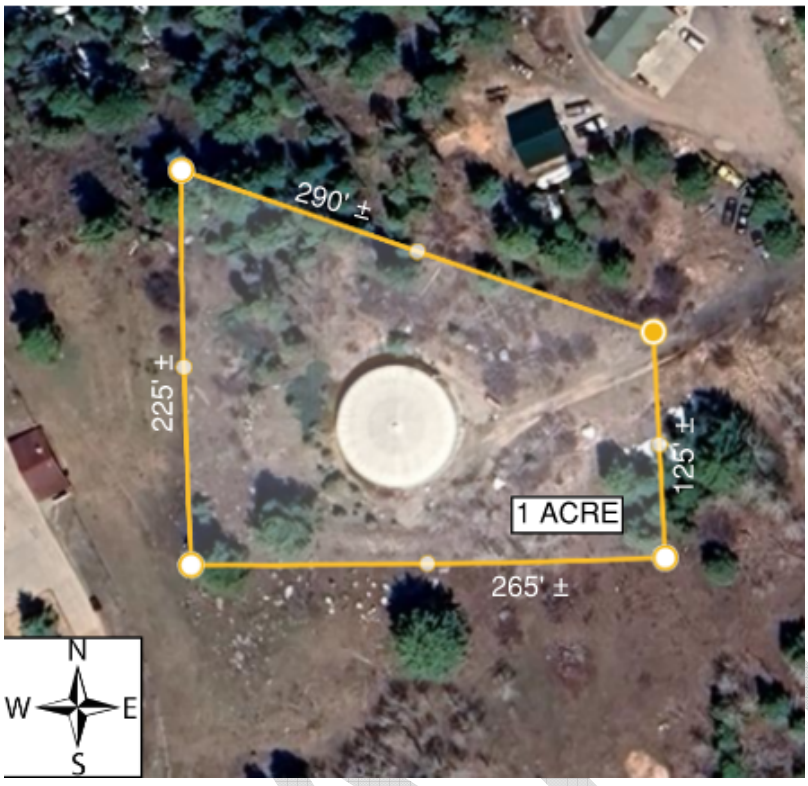

Figure 3. 1 Acre Space Reference Around Tank Site

If a new tank were to be constructed at the existing Tank 2 site with similar diameter the minimum staging space requirements would be 1.25 acres.

Actions or Construction Alternatives

This section describes the alternative actions or construction alternatives to rehabilitate Tank 2.

No Action or Do Nothing

The Do Nothing alternative is taking no action to address Tank 2 deficiencies and use the tank until it is no longer able to be kept in operation. This alternative allows the Town to plan and save money for a new tank project. The cost to rehabilitate the tank is as much or more than constructing a new tank. Even a full Tank 2 rehabilitation may not be able to address all the tanks issues with regards to leaks and corrosion. Leaks and corrosion are likely to pick up where they left off within a few years.

In this alternative Tank 2 would be kept in operation as long as possible or until the end of its useful life. Run the tank until it can't operate anymore and plan for a new tank in the meantime.

Install Bladder System or Tank Liner

The Tank Liner alternative includes installing a tank liner or bladder to the inside of the tank as a temporary fix and attempt to extend the usable lifetime of Tank 2. The liner is typically a Flexible Membrane typically made of High-Density Polyethylene (HDPE) or Polyvinyl Chloride

(PVC) as shown in **Figure 4**. The liners material is made specific to potable water system applications and are NSF 61 approved for use in drinking water.

The liner is generally dimensionally custom made and is secured to the side walls above the high-water mark. The method of securing to the tank side wall varies from a rope system, to using the existing tank bolts, self-taping metal screws or drill new holes with new bolts, nuts and washers. It is common for stainless steel hooks to be connected to the liner to then hang on the securing methods mentioned.

Although this option seems attractive, it is a band aid fix and will expedite the tank corrosion, resulting in an increasingly more unsafe tank structure. Once installed, a new moisture barrier is developed between the tank sidewalls and behind the liner. This area will accumulate and stagnate water, accelerating corrosion of the tank interior. The liners are not built to handle ice and ice accumulation can tear the liners in a matter of a few years. Bringing the tank liner into the tank through the manway will be difficult as well.

This alternative does not address the tanks most severe issue, the roof interior. There is an extreme safety hazard working inside Tank 2 due to the condition of the roof interior. The main beams, cross beams and center support are structurally compromised due to corrosion at connections. Introducing workers into the space could disturb the tank and be catalyst to a beam collapsing. There are cross beams connections that have already corroded to the point of failure and are hanging inside the tank. Adding additional load to the roof may be needed to support part of the liner as well.

This alternative also does not address any of the other tank deficiencies such as overall tank corrosion, access hatches, access hatch or gate alarms, tank vent, overflow weir modifications, and overflow discharge modifications.

Figure 4: Tank Liner System

DRAFT

Install Plural Component Lining System

This alternative is similar to the liner system previously described but involves a spray or roll-on type of application and is preferred over the liner/bladder system. The spray-on application method can be seen in **Figure 5**. The alternative still requires some prep of all surfaces to be coated and a spray-on poly liner that hardens in place, similar to a pipe relining system. This would require workers to access the tank interior. All the same safety risks occur with this alternative as install a liner and potentially more if the roof interior would be coated.

If no work to the roof would be conducted under this alternative it would be the least invasive method of construction over installing a liner/bladder system. The tank sidewalls and floor could be prepped without needing to drill any new holes, remove any bolts, or tap any screws to hang the liner. Bringing the liner in through the manway will be extremely difficult whereas the plural component alternative is only spray hoses and guns or paint rollers and paint buckets.

Figure 5: Plural Component Spray-On Lining System

Overall Tank Rehabilitation and Recoat

This alternative includes addressing all the existing tanks deficiencies and restoring it back to close to new condition. This alternative would require the entire roof to be repaired or a new roof entirely. There is potential for the roof panels to be reused, but the entire roof support structure would need to be rebuilt. This includes all support beams and the center support column. **Figure 6** shows the final phases of a tank rehabilitation, applying sealant and tightening bolts.

The tank would be blasted and recoated along with bolts removed and sealant used to reseal all vertical seams. Bolts would be removed and new gaskets installed on horizontal seams. A new epoxy coating or similar would be applied to the interior and exterior of all metal surfaces excluding the ladder. Any issues to the stem wall foundation would be addressed, the overflow modification would be made with a new overflow discharge, a new roof vent, new roof access points and railing, intruder alarms and any other items outstanding on the tank.

Even though this alternative has the potential to significantly extend the life of the tank and put it in compliance with CDPHE, the cost do so is as much or more than an entirely new tank. After a few years the tank will likely start to see leaks occurring at seams and locations that are prone to leaking and corrosion issues will resurface.

Figure 6: Bolted Tank Blast, Recoat and Reseal

New Bolted or Welded Steel Tank

This alternative would involve constructing a new bolted or welded steel tank. A bolted or welded tank could be constructed either in place of or next to Tank 2 depending on Town operations, and if Minturn requires the tank to be online at all times.

A flat panel over a chime panel tank (existing Tank 2 type) is recommended for a new bolted tank construction. The horizontal flanges where tank panels connect on the exterior of the tank is what differentiates a bolted chime tank and a flat panel bolted steel tank. A standard or flat panel bolted tank has no flanges at panel connections and the panels are overlapped, sealed and bolted together.

Bolted and welded steel tanks have slight differences in the way the tanks are constructed and in their finished forms. Both bolted and welded steel panels are fabricated at the manufacturer and shipped to the tank site for the contractor to assemble. A bolted tank will have panels that bolt together versus panels that are welded together. Bolted tanks often come with a factory coating such as fusion bonded epoxy or glass lined. The bolted panels are made watertight using sealant and bolting the panels together. A welded tank will be welded together in the field to be made watertight and then have coating applied via either spray or roll on application. **Figure 7** shows a finished welded steel tank and **Figure 6** and **Figure 8** show flat panel bolted tank examples.

Bolted and welded each have their pros and cons but are generally similar. It is good practice to specify and bid out an alternative for each type of tank and select the lowest respective alternative to get the best tank prices. The new Tank 2 height could be built to match Tank 3 height, specifically overflow or high-water level to optimize system hydraulics and pressures.

DRAFT

For the same 600,000-gallon capacity, a taller tank would result in a smaller diameter thus requiring less space.

Figure 7: Finished Welded Tank

Figure 8: Finished Panel Bolted Tank

DRAFT

New Concrete Tank

This alternative consists of constructing a new concrete reservoir at the Tank 2 site. A concrete tank could either be constructed in place or next to Tank 2 depending on Town operations, and if Minturn requires the tank to be online at all times

A new concrete tank alternative is the most expensive of all of alternatives but has the longest life expectancy and least amount of maintenance required. Concrete tanks typically have a 75-year life span versus that of 40 years for a bolted or welded. There are minimal areas for corrosion due to minimal metallic material being used in tank construction. There are no seams in concrete tanks so leaks are less common in wall portions. **Figure 8** shows an example of a finished concrete tank.

Figure 8: Finished Concrete Tank

Alternative Cost Estimates

This section provides cost estimates for the alternatives previously discussed. Please note these are construction cost estimates only and do not include any engineering fees, testing and material fees, permitting fees, inflation uncertainties, tariff uncertainties or any other miscellaneous fees associated with construction alternatives.

No Action or Do Nothing

The cost for this alternative is as the action implies, nothing. Due to no action being conducted or work commencing, this option will be at no cost to the Town and the intent would be to save any money allocated for tank repairs or improvements. In addition to saving money, where applicable all attempts to secure additional funding and grants should be taken.

Install Bladder System or Tank Liner

The cost for this alternative is relatively unknown as finding a contractor who is willing to install the bladder system. This is based off working with notable tank contractors throughout the country. Of the 5 contractors HDR spoke with regarding a liner system for Tank 2, all 5 contractors strongly recommended against and would not be willing to provide a quote to install a liner system. All contractors had safety concerns with working inside the tank due to the interior roof condition and were not willing to take the risk.

HDR roughly estimates this alternative to cost $500,000 if a contractor were to agree to complete the work. The liners are not typically installed in cold climates making relevant sample installs tough to come by as well as contractors willing to install them. The failing and deteriorating interior roof system is not priced into consideration with this alternative. Adding roof work to a bladder installation will likely increase the cost of this alternative to be similar to a new bolted or welded steel tank alternative.

Install Plural Component Lining System

The cost for this alternative was indicated at $25/square foot from one of the five contractors HDR coordinated with for tank construction alternatives. The bottom or floor surface is estimated at 3,425 square feet and the side walls at 5,000 square feet. The roof system is difficult to estimate due to the tight areas around beams and all surfaces associated with the roof structure. As a baseline estimate, the floor surface area is used and doubled to account for support structure or roof beams. Summation of the floor, side walls and roof structure results in 15,275 square feet (16,000 square feet for estimating purposes). 16,000 square feet multiplied by the $25/square foot to install product results in a $400,000 cost.

If the roof system were to be untouched, the area would be 8,425 square feet (9,000 square feet for estimating purposes). This results in a cost of $225,000 to line the tank floor and side walls only. Whether the roof has plural component installed or not, this fee estimate still does not address outstanding issues and safety concerns with the roof structure. Adding the roof structure deficiencies repairs into the plural component lining alternative cost would increase the cost of this alternative to be similar to a new bolted or welded steel tank option.

Adding a cost of $50,000 for mobilization, this alternative cost estimate ranges from $275,000 to $450,000 depending on if the roof structure rehabilitation is included or not.

Overall Tank Rehabilitation and Recoat

The cost for this alternative was not provided by any tank contractors but was indicated to be as much or more than a new bolted or welded steel tank option. Even after a full tank rehabilitation, existing weak spots in the tank and excessive areas of corrosion are likely to resurface in a matter of a few years. The roof system would be fully reconstructed or built new as a part of this alternative and is a large expense. Removing all panel bolts, blasting, recoating, resealing and bolting panels back together is a timely process as well. The entire tank would need to be taken apart and put back together one piece at a time.

DRAFT

To put a number to this alternative for estimating purposes and based off past tank rehabilitations, the cost for this alternative would be estimated at $1,500,000. Because this cost is higher than the estimate for an entirely new tank, this alternative is not recommended.

New Bolted or Welded Steel Tank

Bolted steel tanks are typically less expensive than a welded steel tank due to constructability, although the end products are similar. Bolted steel tanks are often made in control conditions with coatings applied and ready to ship and assemble. Welded steel tank panels ship to the site and have to be seal welded together by hand. The welded tank then needs to have steel prepped, primed and final coated once all the weld tests have passed. There is a time saving component to the bolted tank.

A new glass lined bolted steel tank is an estimated $700,000 versus a new welded steel at $1,400,000. This does not include any site piping and connections to the new tank. Tank contractors typically do not perform pipeline installations outside of tank inlet/outlet connections. For this reason, it is advised to bid out the site piping work associated with a new tank construction to a separate pipeline contractor.

Site piping can be investigated further if a new tank construction is selected alternative by the Town. The site piping would not change if a bolted or welded steel tank are selected. Given the current site, a temporary site piping number for budgeting purposing could be $200,000.

Demolition of the existing tank is also not considered in the price for a new tank, however, could be estimated at $100,000. Contractors are often willing to take the old tank metal and use as scrap or sell metal. It would be recommended to allow for the contractor to take the tank with them to get the best value for a tank demolition.

Summating tank demolition, site piping and a new tank result in $1,000,000 for the bolted tank option.

New Concrete Tank

A new concrete tank is the most expensive alternative of all alternatives considered in this memorandum. The new construction price for a concrete tank is $1,800,000. Although this alternative is the most expensive, the life expectancy of a concrete tank is over 75 years, nearly double that of a bolted or welded steel tank. The maintenance is also minimal or less than the maintenance of a bolted or welded steel tank.

A concrete tank may cost nearly twice as much, but considering a bolted/welded tank replacement in 30 to 40 years could present future cost savings. The costs over the 75-year lifetime of the tank would likely be lower than that of bolted/welded tanks.

The same site piping and demolition work as the bolted or welded tank alternatives can be assumed. Summating tank demolition, site piping and a new tank result in $2,100,000 for a new concrete tank alternative.

DRAFT

Contractor Outreach

Five contractors that specialized in tank rehabilitation and new tank construction were contacted for input and cost estimates for budgeting purposes for this memorandum. Four of the five contractors were specific to bolted/welded tank rehabilitation and constructing new tanks. The fifth tank contractor was specific the new concrete tank construction. The contractors included Maguire Iron, Phoenix Tank, DN Tanks, Great Plain Structures and Northern Steel Tank. DN Tanks is the respective new concrete tank contractor and the other four are the steel tank rehabilitation or new tank construction expertise.

All the tank contractors recommended against the liner/bladder alternative.

The feedback provided was generally in agreement with running Tank 2 as long as possible and saving money for a new tank option.

CDHPE Tank Permitting and Application Requirements

The permitting process for a new tank construction versus a tank lining vary significantly. A tank lining or recoating has no agency reviews, monitoring plan or PE approval. A new tank construction would require agency reviews, monitoring plan and PE approval. If a tank is rehabilitated and has major structural work or rebuilds there is an agency review and PE approval requirements, but a monitoring plan is not required.

A new tank construction or tank rehabilitation project will require an application to CDHPE. **Table 1** shows tank project requirements by type of project with regards to agency reviews, monitoring plans and PE approvals.

Table 1: Tank Project Requirements by Type

Item	Description	Default Dept Design Review Req'd	Monitoring Plan Update Req'd	PE Req'd for CWS
DS	**Distribution system projects including tanks**			
DS-1	Storage tank: New distribution system storage tank	Yes	Yes	Yes
DS-4	Storage tank: Recoating or relining a tank with ANSI/NSF 61 certified product.	No	No	N/A
DS-6	Storage tank: Major structural work or rebuilds (e.g., replace roof)	Yes	No	Yes

Recommendations

A list of general recommendations based on the review of all projects and conclusions in this tech memorandum is as follows:

1. Alternative a) No Action or Do Nothing is the recommended short-term approach. Operate tank 2 until the Town determines they can no longer operate the tank. Once Tank 2 is offline the additional volume that can't be used by Tank 3 will now be usable, offsetting the storage loss to the system. This would be prior to any PRV, or control structures set in place between Tank 2 and Tank 3.

2. If not already, begin planning and saving for a new tank within the next 5 years.

3. If applicable, the money allocated for a tank liner/bladder system or tank rehabilitation be saved for a new tank or used for other infrastructure improvements as seen fit by the Town.

4. Seek and apply for funding for a new tank construction.

5. Alternate e), construction of a new bolted or welded steel tank is the recommended alternative to address Tank 2 deficiencies and CDPHE violations. Construct a new bolted or welded steel tank is recommended over install a liner/bladder system, plural component liner, and tank rehabilitation alternatives.

6. Alternate f) construction of a new concrete tank should not be ruled out immediately, unless time is of the essence. Due to funding cycles, there may be enough time to consider tank alternatives in more detail. A concrete tank will take more planning and constructing further out into the future than the other tanks, but the long-term savings potential and minimal maintenance requirements need strong consideration.

DRAFT