

FINAL REPORT

Alternatives Evaluation

YTID Tieton Canal Repair/Replacement and Related Alternatives

Yakima River Basin Integrated Plan Yakima, Washington

Prepared for

State of Washington Department of Ecology
Yakima-Tieton Irrigation District

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Acronyms and Abbreviations

AF	acre-foot
APD	alternative project delivery
cfs	cubic feet per second
CH2M	CH2M Engineers, Inc.
CMAR	construction manager at risk
DB	design-build
DBB	design-bid-build
DBO	design-build-operate
EA	environmental assessment
EIS	environmental impact statement
FCR	French Canyon Dam and Regulating Reservoir
FPDB	fixed price design-build
Integrated Plan	Yakima River Basin Integrated Water Resource Management Plan
kW	kilowatt
kWh	kilowatt-hour
N/A	not applicable
NEPA	National Environmental Policy Act
NFCCR	North Fork Cowiche Creek Reservoir
O&M	operations and maintenance
P3	public-private partnership
R/R	rehabilitation/replacement
RCB	Precast Reinforced Concrete Box
Reclamation	Bureau of Reclamation
SEPA	State Environmental Policy Act
TWUA	Tieton Water Users' Association
YTID	Yakima-Tieton Irrigation District

Executive Summary

The Yakima-Tieton Irrigation District's (YTID's) Tieton Canal is now more than 100 years old and is the only source of irrigation water for more than 4,000 users. Portions of the existing canal have failed numerous times because of age, unstable geology, and storm events. Canal failures disrupt the delivery of water to high-value tree-crops and are costly to repair. Therefore, YTID is actively pursuing strategies to repair or replace the canal, improve its reliability, and avoid potentially catastrophic losses of service to its users. The purposes of this study are to:

1. Identify and review four primary canal repair or replacement concepts developed in previous studies
2. Identify additional alternatives that are available through combinations of the original alternatives
3. Compare and evaluate alternatives using a common set of cost and noncost evaluation criteria
4. Identify preferred alternatives and implementation strategies

Broad Project Concepts

Since 2013, CH2M HILL Engineers, Inc. (CH2M) has been evaluating alternatives to help YTID determine the best course of action for repairing or replacing the Tieton Canal (reviewed in Section 2 of this report). Prior studies have focused on four distinct project concepts to address YTID's needs, summarized herein:

1. Baseline Alternative (Tieton Canal Repair)
2. Tieton Canal Replacement
3. North Fork Cowiche Creek Reservoir
4. Diversion Relocation to Wapatox Diversion Dam (and associated new conveyance system)

Baseline Alternative (Canal Repair)

CH2M and YTID developed a Baseline Alternative that includes repairing the existing canal in its current location. The Baseline Alternative is considerably less costly than other alternatives that replace the existing canal. However, canal repair effectiveness is limited and will not provide the same reliability, risk reduction, longevity, increased capacity, or flexibility as other alternatives being considered. It consists of shoring eroded steep slopes with gabion walls, installing canal covers, replacing sections with 102-inch-diameter corrugated metal pipe, and sealing the canal with a flexible urethane type lining (possibly AquaLastic). One option for extending the canal's longevity would be to replace the canal's invert with a mortar lining. Based on the analysis, the canal lining would reduce canal capacity. YTID has indicated that any reduction in capacity could significantly impact water deliveries, and therefore mortar lining is not recommended as part of the Baseline Alternative.

The Baseline Alternative represents practical improvements that can be implemented to nominally extend the life of the canal and maintain a viable water supply, potentially with minimal outside support or funding. It is expected that this would represent a one-time fix that could not be repeated to further extend canal life, and that eventually YTID would need to invest in full canal replacement or one of the other strategies.

Tieton Canal Replacement

In 2013, CH2M completed an alternatives study for replacing the Tieton Canal with a combination of box culverts, pipelines, and tunnels. The preferred alternative that emerged from that study consisted of the following tasks:

- Constructing 6-foot-high-by-10-foot-wide precast reinforced concrete box culvert (RCB) sections that replace the Tieton Canal from the Tieton River Diversion to the Windy Point Tunnel

- Rehabilitating the Windy Point Tunnel, installing a new 96-inch-diameter pipeline parallel to the Tieton River downstream of Windy Point Tunnel
- Constructing a new 96-inch-diameter tunnel connecting the pipeline to FCR

North Fork Cowiche Creek Reservoir

In the fall of 2016, a *Draft North Fork Cowiche Creek Reservoir Feasibility Study* (CH2M, 2016) considered a new, larger reservoir just upstream of FCR. The North Fork Cowiche Creek Reservoir (NFCCR) is a proposed off-stream water storage reservoir located approximately 0.5 mile upstream of FCR on the North Fork Cowiche Creek. This 35,000-acre-foot (AF) reservoir would increase available water supplies in the lower Yakima River Watershed and provide agricultural and environmental benefits consistent with the goals and objectives of the Yakima Basin Integrated Plan. The NFCCR concept would not replace the Tieton Canal but could be combined with the Tieton Canal or other alternatives for increased water supply and flexibility.

Diversion Relocation to Wapatox Diversion Dam

In late 2016 and early 2017, another project concept was evaluated that would replace the Tieton Canal and provide additional benefits. The “Wapatox Project” would relocate the existing YTID diversion from the Tieton River to the Naches River near the existing Wapatox Canal and Diversion Dam, increasing Tieton River flows over its lower 15 miles. The project would rely on the existing Wapatox fish screen at the head of the Wapatox Canal, and would require a new pump station and approximately 3 miles of 96-inch diameter tunnel and pipeline that would connect to the existing YTID main pipeline located approximately 0.7 miles east of FCR.

Specific Project Alternatives

As part of this evaluation, CH2M has developed potential combinations of the various concepts described herein, and optimized facility size and implementation phasing to establish a comprehensive list of alternatives to compare. To be considered viable for further evaluation, each alternative was required to provide the following:

- Reliable water supply – capability to deliver YTID’s full water right (100,492 AF per year)
- Distinct characteristics, benefits, or costs unlike other alternatives
- Technical feasibility
- Institutional or regulatory feasibility

Table ES-1 summarizes the alternatives that are evaluated in this report, including descriptions of the key elements and sizes of the major conveyance and storage features.

Table ES-1. Project Alternatives

Alternative No.	Name	Description	Comments	Conveyance System Capacity (cfs)	NFCCR Capacity (AF)
1	Repair Existing Tieton Canal	Repair existing canal in its current location (Baseline Alternative)	<ul style="list-style-type: none"> See Appendix A for description of project facilities and cost estimates. 	345	N/A
2A	Construct New Tieton Canal	Replace existing Tieton Canal with combination of new box culvert, 96-inch-diameter pipeline, and tunnel improvements	<ul style="list-style-type: none"> Project facilities and cost estimates are described in CH2M, 2013 	370	N/A
2B		Construct same alternative as (2A), but with phased construction	<ul style="list-style-type: none"> Install downstream pipeline reach initially, then construct upstream box culvert reach 30 years later 	370	N/A
3	Combination of Repair and Replacement of Tieton Canal	Replace downstream reach with new pipeline, repair existing upstream reach	<ul style="list-style-type: none"> The existing canal below Windy Point Tunnel would be replaced with a 96-inch-diameter pipeline, and the existing canal upstream of Windy Point tunnel would be repaired using the Baseline Alternative 	345-370	N/A
4	Construct NFCCR Only	Construct new dam and 35,000-AF reservoir	<ul style="list-style-type: none"> Project facilities and cost estimates are described in CH2M (2016) 	370	35,000
5	Construct Wapatox Pump Station and Pipeline Only	Construct new pump station on the Wapatox Canal and new 3-mile-long, 96-inch-diameter pipeline	<ul style="list-style-type: none"> Project facilities and cost estimates are described in CH2M (2017) 	345-370	N/A
6A	Construct Wapatox Pump Station and Pipeline with NFCCR	Combine full-capacity Wapatox project with full-capacity NFCCR (includes Naches River release)	<ul style="list-style-type: none"> Provides opportunity to maintain full reservoir year-round for carry-over storage or fill the reservoir more than once per year, or both 	345-370	35,000
6B		Optimize Wapatox project and NFCCR based on existing YTID water right (does not include Naches River release)	<ul style="list-style-type: none"> 100,492-AF (YTID water right) lifted by Wapatox Water is delivered directly into distribution system or stored in NFCCR Existing Nov-March diversion restriction is maintained 	264	19,000

Table ES-1. Project Alternatives

Alternative No.	Name	Description	Comments	Conveyance System Capacity (cfs)	NFCCR Capacity (AF)
7A	Repair Existing Tieton Canal and Construct NFCCR	Repair existing Tieton Canal in its current location and construct full size NFCCR	<ul style="list-style-type: none"> • Full-sized NFCCR • Tieton River diversions restricted to March-October to avoid ice issues 	345	35,000
7B		Repair existing canal in its current location and construct smaller NFCCR	<ul style="list-style-type: none"> • Optimized NFCCR size • Tieton River diversions restricted to March-October to avoid ice issues • Repaired canal would not need to flow at its capacity because of availability of storage 	345	19,000
8A	Repair Tieton Canal (upper reach) and Construct New Tieton Canal (lower reach) and NFCCR	Construct full-capacity Tieton Canal Replacement (lower reach), repair Tieton Canal (upper reach), and construct NFCCR	<ul style="list-style-type: none"> • Full-sized NFCCR • Tieton River diversions restricted to March-October to avoid ice issues 	345-370	35,000
8B		Construct smaller capacity Tieton Canal replacement (lower reach), repair Tieton Canal (upper reach), and construct NFCCR	<ul style="list-style-type: none"> • Optimized NFCCR size • Tieton River diversions restricted to March-October to avoid ice issues • Repaired canal would not need to flow at its capacity because of availability of storage 	264	19,000

Comparison of Alternatives

This report compares and evaluates the alternatives based on construction cost, operational, annual, and replacement costs, as well as key noncost factors that are relevant to implementing a project of this scale. Comparisons were made based on cost factors and noncost factors summarized in Table ES-2.

Table ES-2. Evaluation Criteria and Performance Measurement Factors

Cost Factors	Noncost Factors
Project Capital Cost	Constructability
Project Annual O&M Costs	Institutional and Regulatory Compliance
Project Replacement Cost (new pumps, etc.)	YTID Operations and Maintenance
Total Project Cost per Share	Reliability
	Stakeholder Acceptance and Potential to Attract Funding Partners
	Implementation Flexibility

Notes:

O&M = operations and maintenance

Estimates of capital, O&M, and replacement costs were based on prior YTID reports on each project concept, scaled where appropriate for modified facility sizes, and updated as needed for a common frame of reference on construction timing. Estimates of total project cost per share employed a financial analysis that factored in overall investment in new construction and O&M of new facilities, financing, existing nonproject operating costs, inflation, replacement costs, and potential outside funding assistance. Figure ES-1 summarizes the following for each alternative:

- Estimate of total capital cost (2022 dollars), O&M and power costs (2025 dollars), and Rehabilitation/Replacement (R/R) or Deferred Construction Costs (2052 dollars)
- Estimated total share price for YTID water assuming various levels of outside cost sharing
- Assessment of noncost factors, where:

- | | |
|---|--------------------------|
| ● | indicates more favorable |
| ◐ | indicates neutral |
| ○ | indicates less favorable |

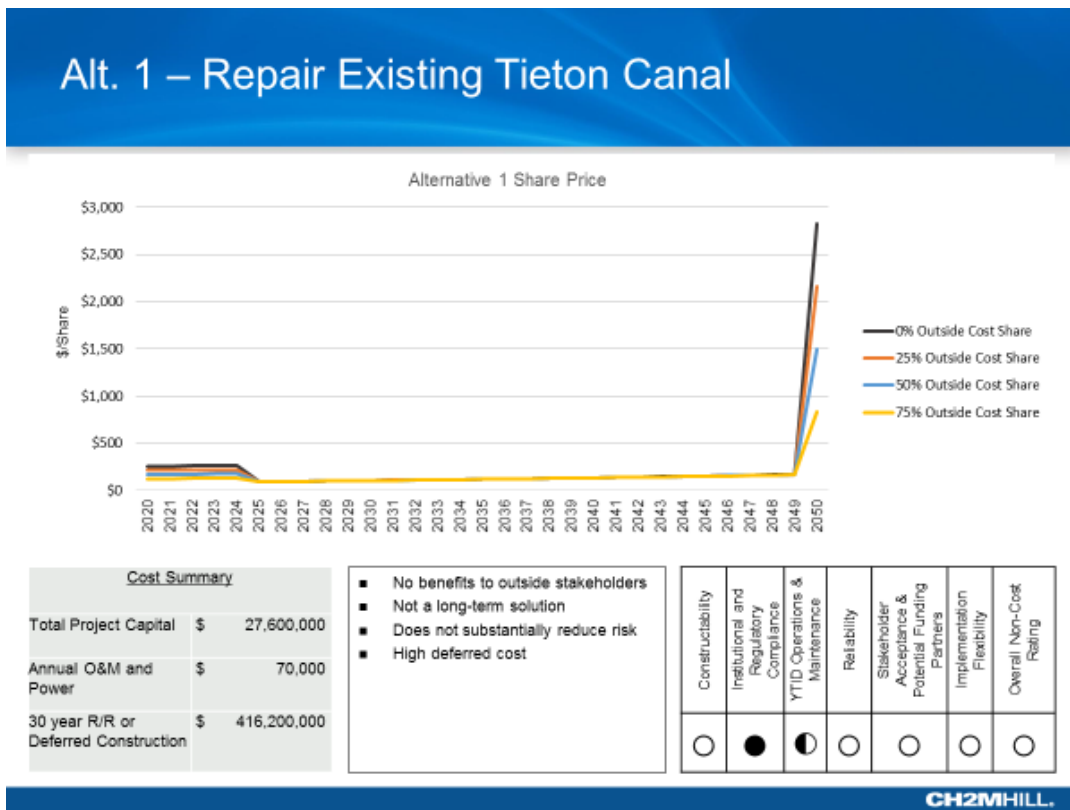


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 1 of 12

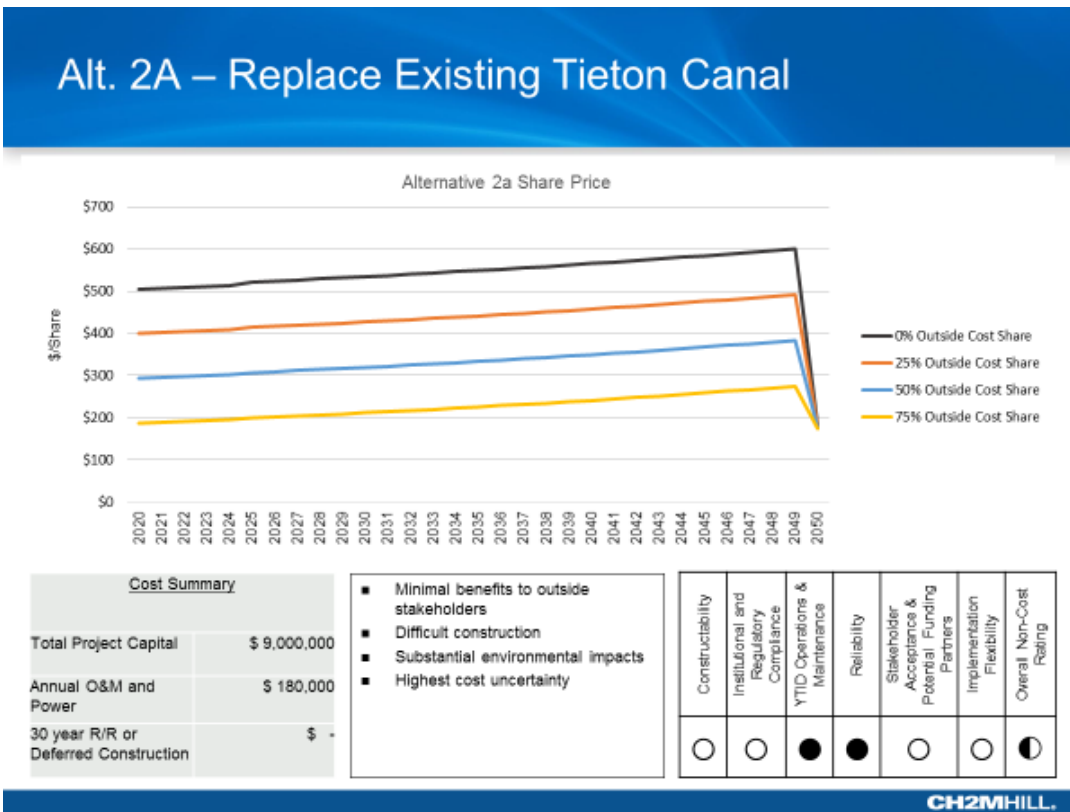


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 2 of 12

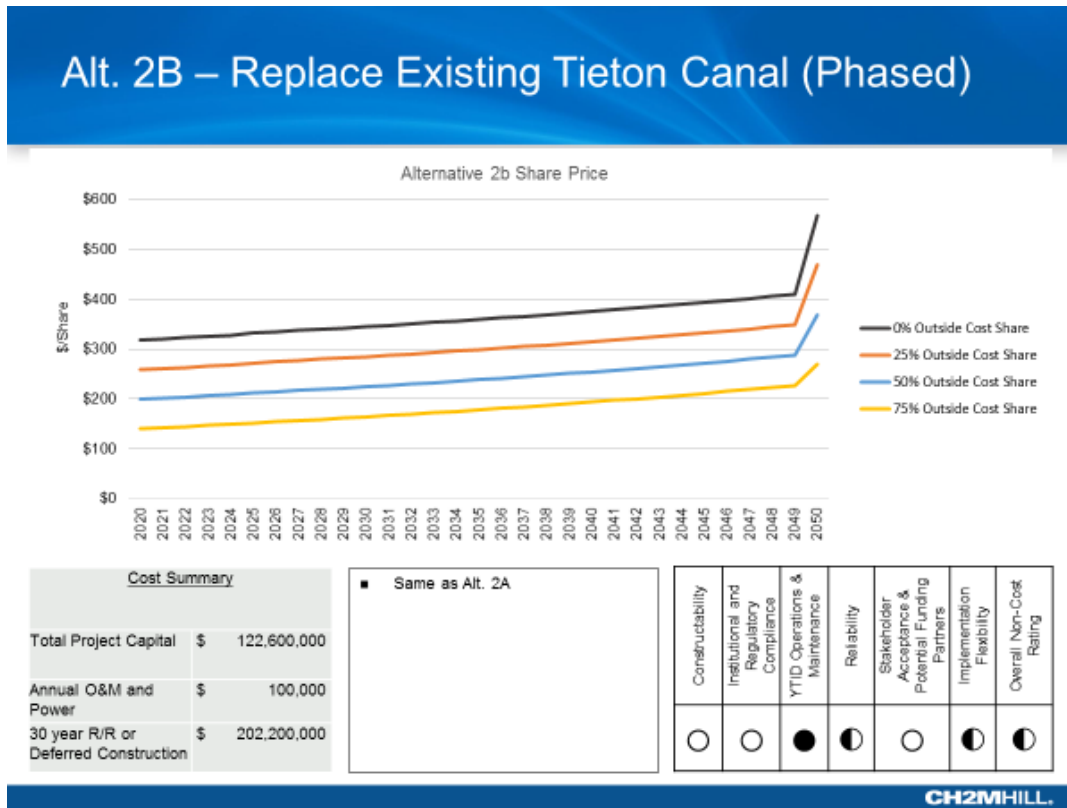


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 3 of 12

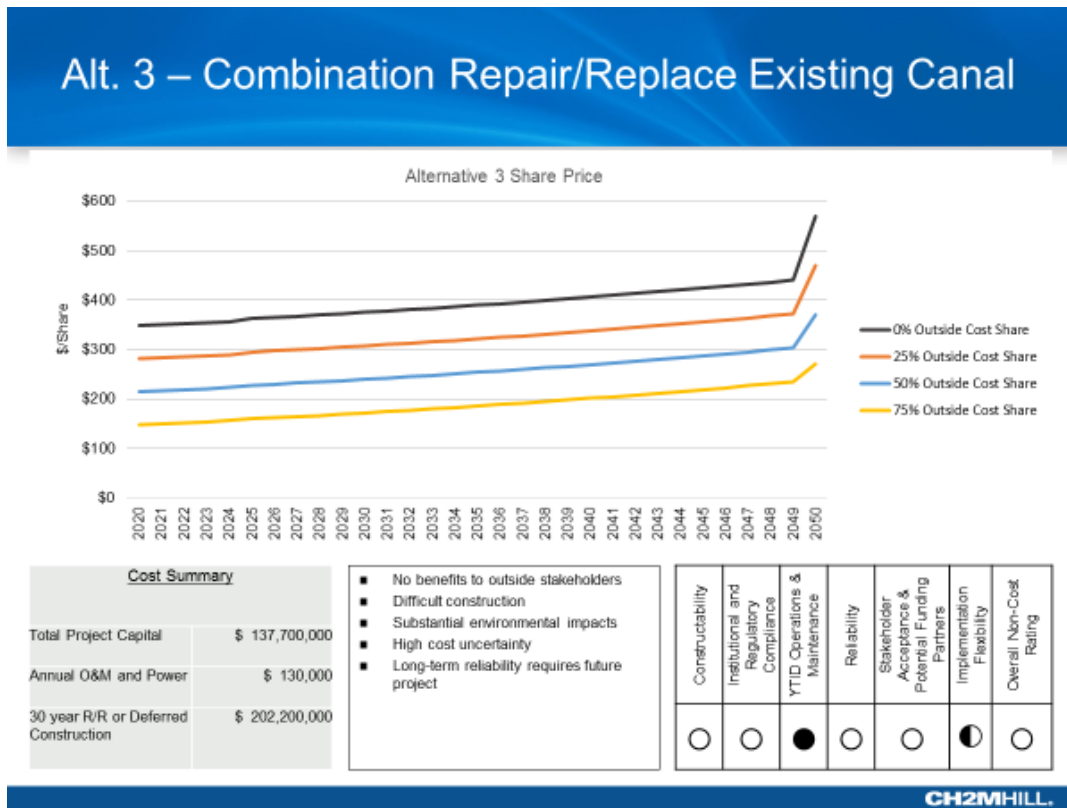


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 4 of 12

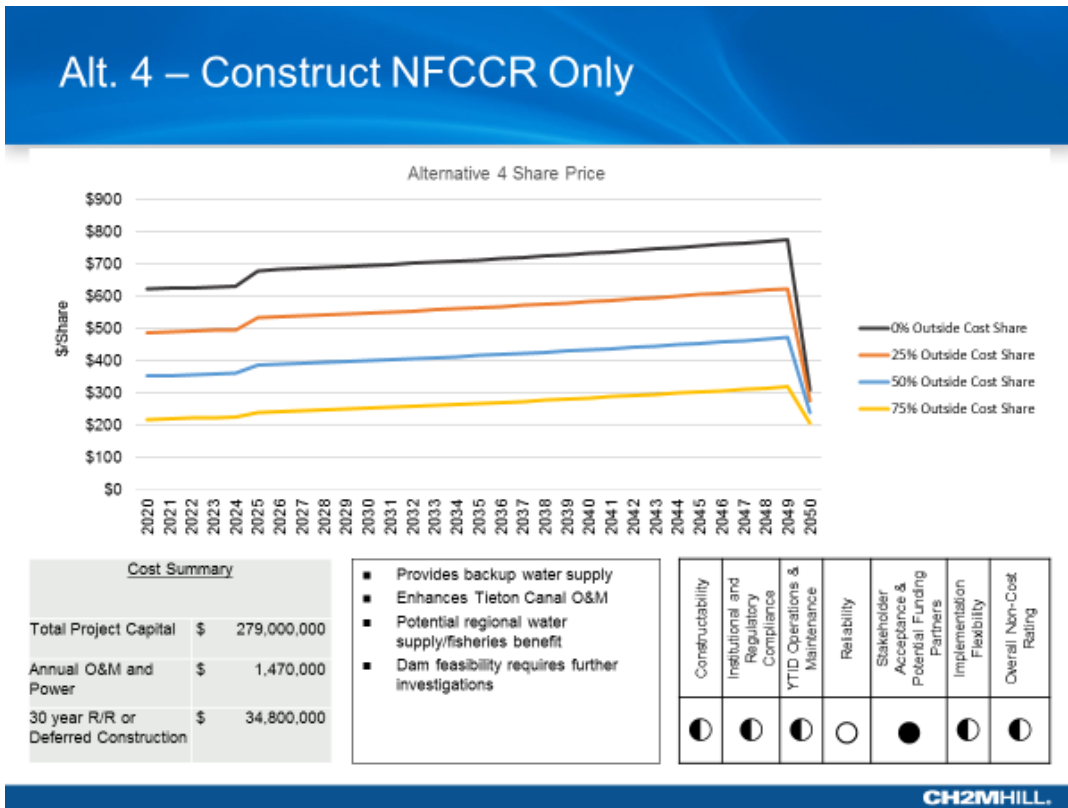


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 5 of 12

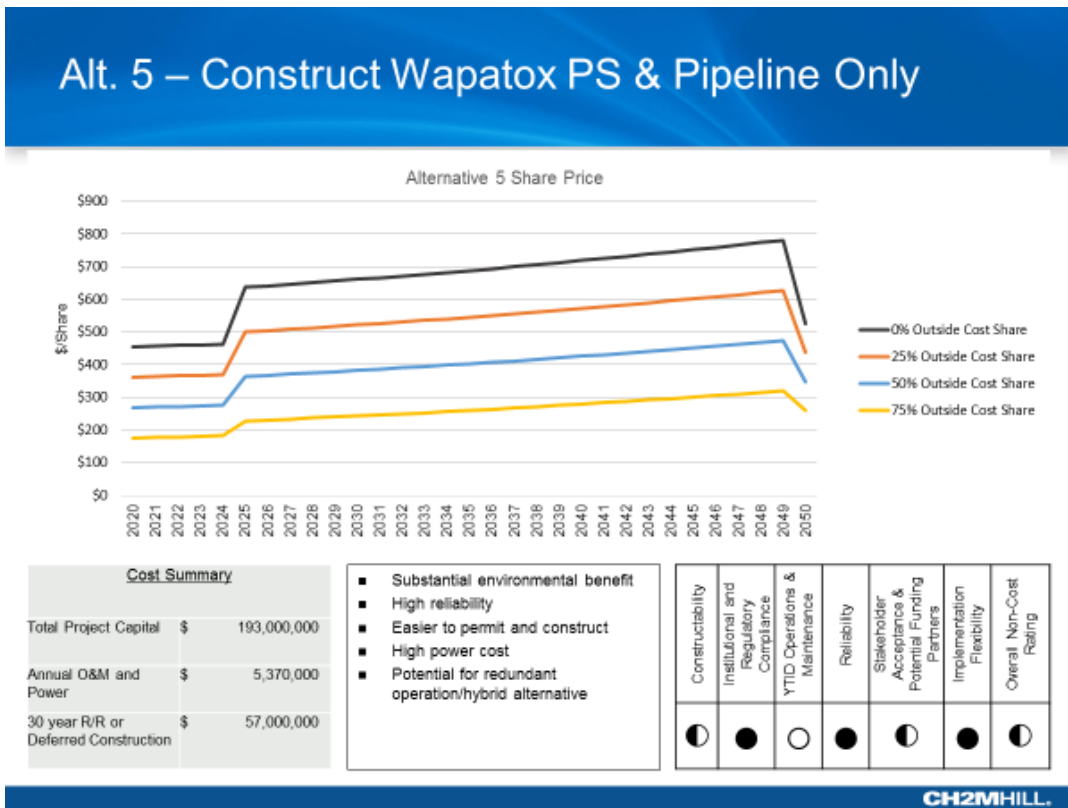


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 6 of 12

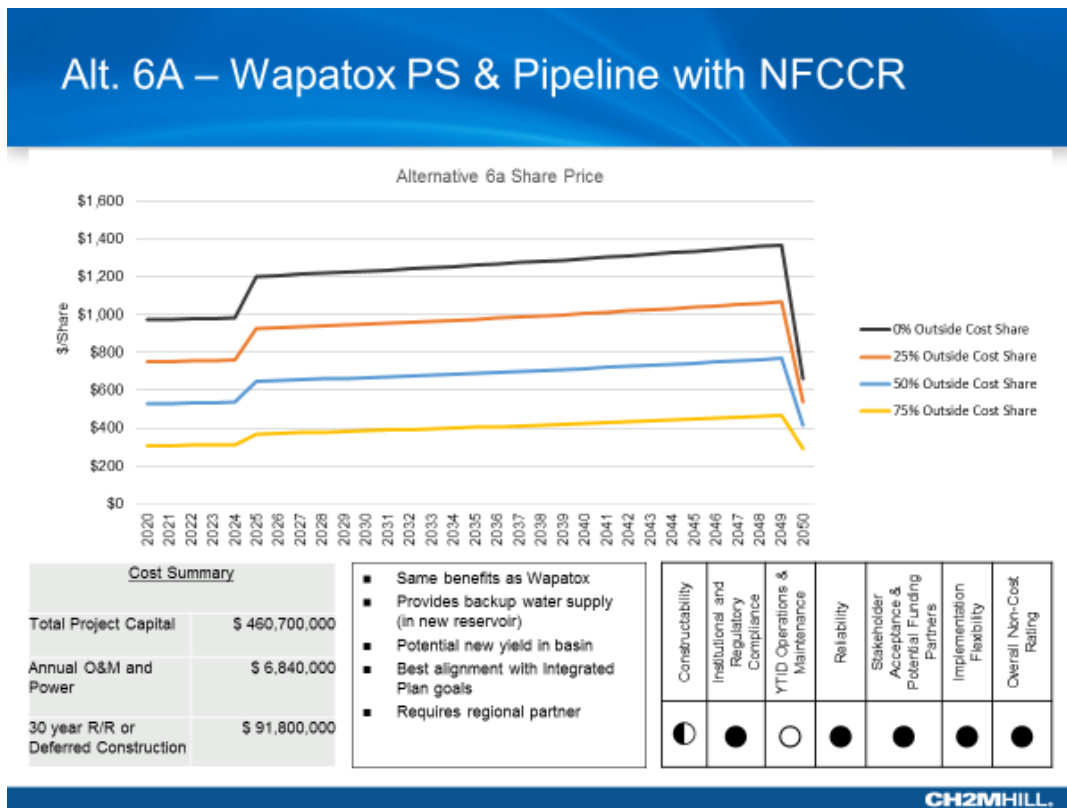


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 7 of 12

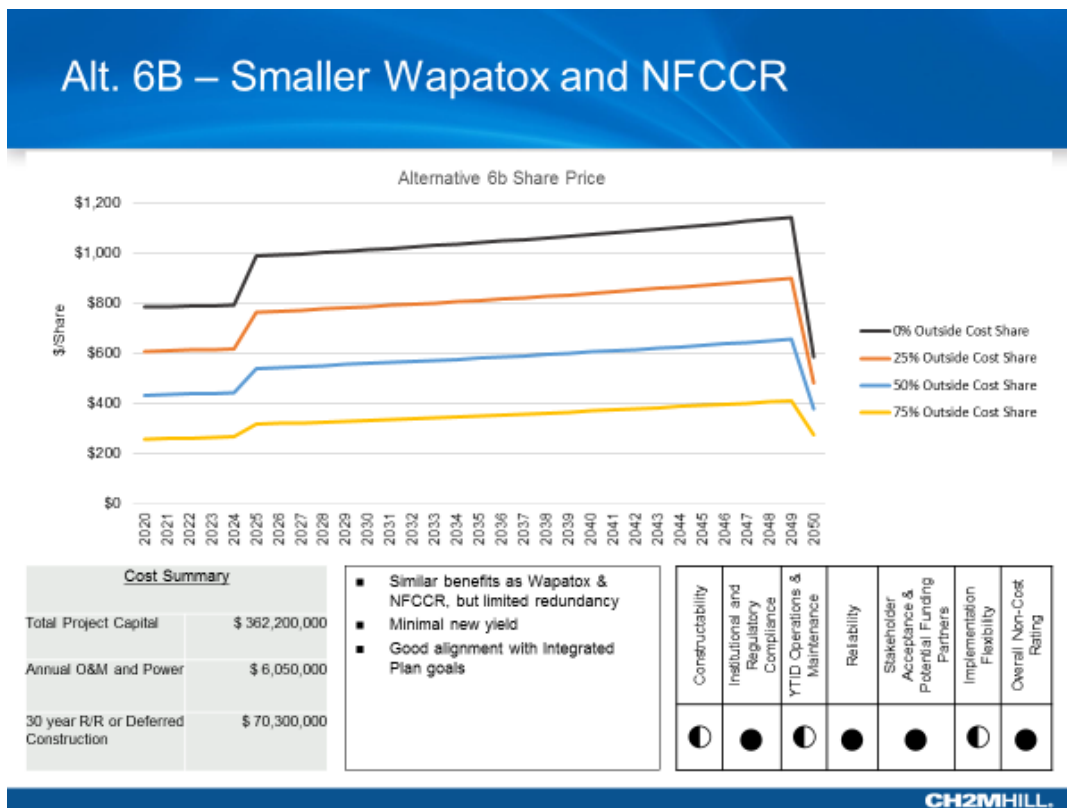
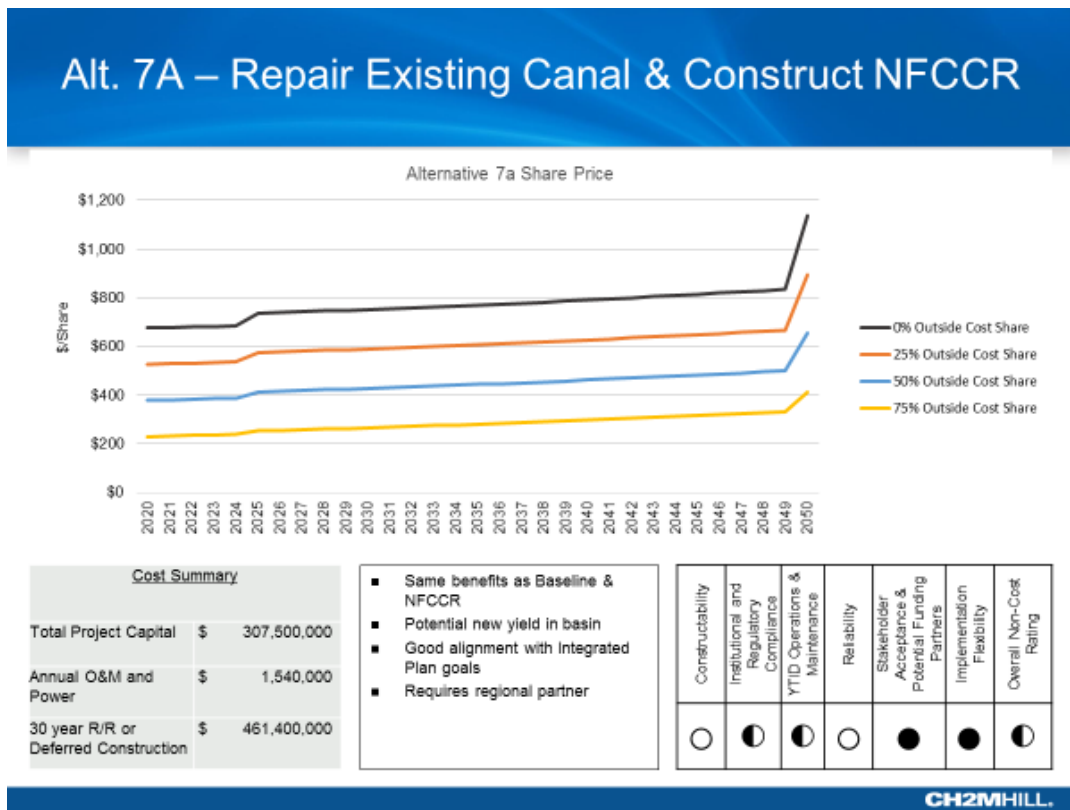
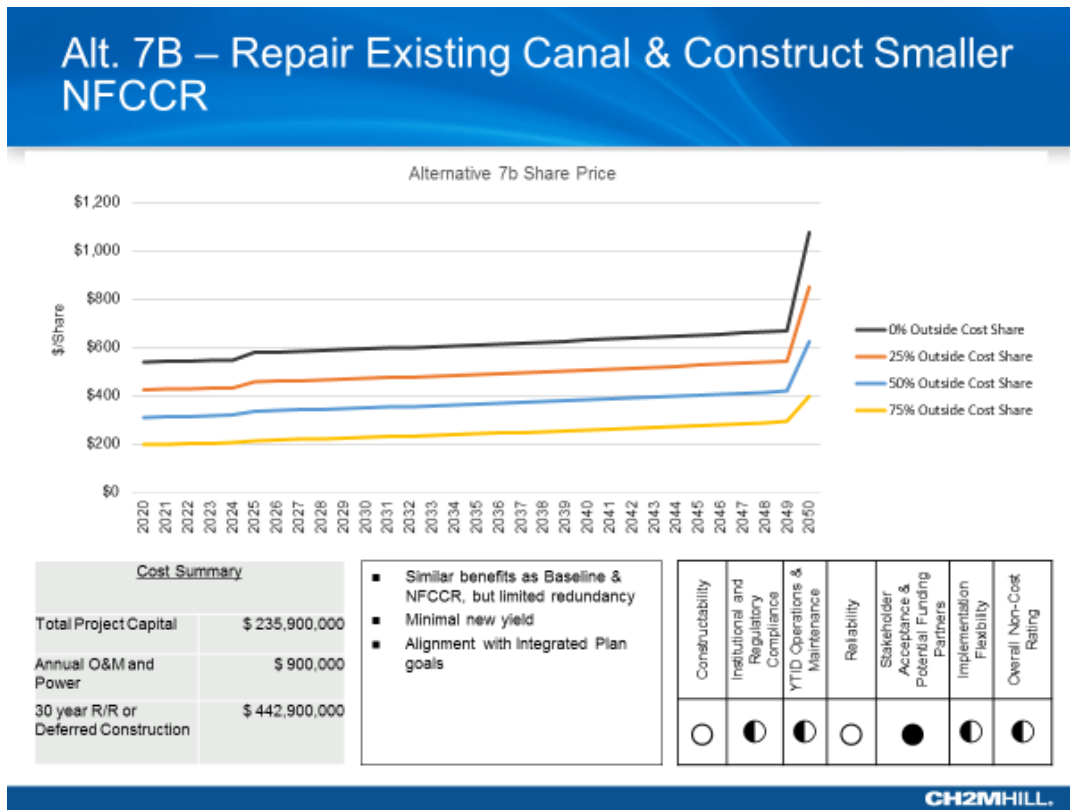


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative
Part 8 of 12



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Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative Part 9 of 12



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Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative Part 10 of 12

Alt. 8A – Tieton Canal Repair/Replacement and NFCCR

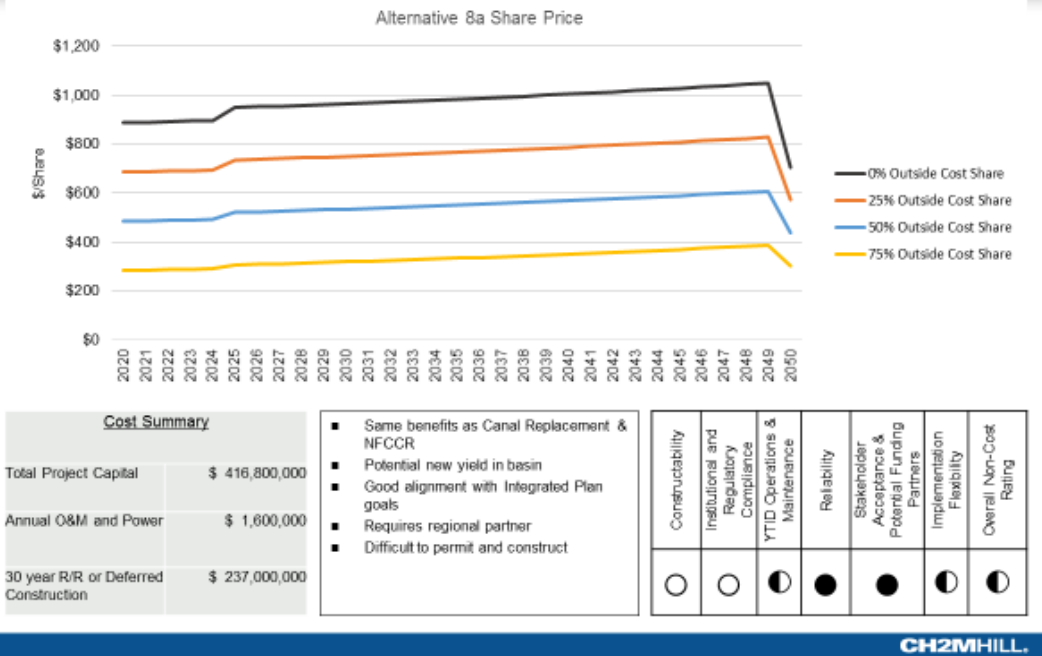


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative *Part 11 of 12*

Alt. 8B – Tieton Canal Repair, Smaller Replacement and Smaller NFCCR

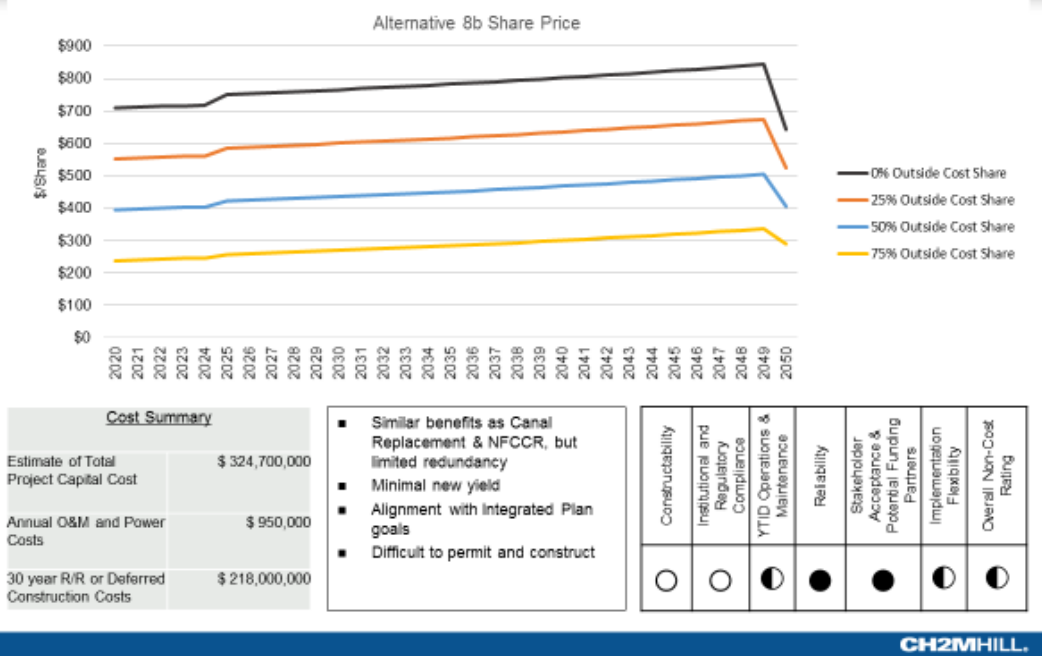


Figure ES-1. Summary of Costs, Share Price, and Non-cost factors for Each Alternative *Part 12 of 12*

Conclusions and Recommendations

This investigation has demonstrated that YTID has at least 12 potentially viable alternatives for repairing or replacing the Tieton Canal and extending its useful life. Project cost estimates and noncost attributes for these alternatives vary widely, and many alternatives are cost-prohibitive to YTID without significant outside assistance. It is also clear, however, that several of these alternatives provide significant benefits to the environment and benefits to other Yakima Basin water users and stakeholders. Several alternatives are well-aligned with the goals and objectives of the Yakima Basin Integrated Plan. Yakima Basin stakeholders may be willing to support a selected alternative to realize these benefits. The conclusions and recommendations presented below are organized in terms of support levels from non-YTID stakeholders.

Alternatives that Require Limited Stakeholder Participation

Two options are available to YTID that do not require significant outside stakeholder participation, specifically Alternatives 1 and 2B.

Alternative 1, the Baseline Alternative, would repair the existing canal in its current location. Although this alternative is both feasible and affordable, it would probably extend the life of the existing canal by only 20 to 30 years. The canal would remain vulnerable to failure from age deterioration and landslides. After 20 to 30 more years of operation, YTID would be faced with its current predicament, and even greater project costs and environmental obstacles to replace the canal. It is also important to note that after 20 to 30 more years of operation, YTID's 200-mile-long network of distribution pipelines downstream of FCR will be nearly 60 years old. Significant maintenance and replacement costs may be required to maintain current service levels from the pipelines. The pipeline maintenance and replacement costs would be above and beyond the cost of replacing the canal.

In the absence of significant stakeholder participation, Alternative 3 may be YTID's best option. Alternative 3 would replace the downstream half of the Tieton Canal with a new 96-inch-diameter pipeline as soon as permits and funding were available. The upstream half of the canal would be repaired in its current location in the same fashion as Alternative 1. Alternative 3 would be beneficial to YTID because it would replace the most vulnerable half of the existing canal and extend the life of the remaining reach, at a total cost that may be within YTID's current available funding. Another advantage of Alternative 3 is gravity operation, similar to the existing canal, which would keep long-term O&M costs low. Disadvantages of Alternative 3 include difficult construction conditions, land-acquisition requirements, and significant permitting and environmental mitigation obstacles. The pipeline is located adjacent to the Tieton River, within high-value riparian habitat on federal, state, and private property. The new pipeline would not provide significant benefits to stakeholders outside of YTID, and is not as well-suited for the future implementation of the NFCCR. The new aqueduct would not have access to water from the Naches River, and would not be suitable for year-round operation due to winter icing and access conditions. Another disadvantage is that after 20 to 30 more years of operation, YTID would likely need to replace the upper reach of canal, meaning that the costs saved initially by only repairing this reach would be borne at a later date. Further, the initial repairs in the upper reach do not completely remove risks of failure.

Alternatives that Require Significant Stakeholder Participation

If outside stakeholder participation and funding are available, several additional feasible and beneficial alternatives are available to YTID. Alternative 5 involves constructing the Wapatox pump station and pipeline. This alternative would replace the existing 12-mile-long Tieton Canal with a new pump station and 3-mile-long, 96-inch-diameter tunnel and pipeline. YTID's point of diversion would be moved from the Tieton River to the Naches River, using the existing Wapatox diversion and fish screen at the head of the Wapatox Canal. Alternative 5 is desirable because of its relatively low capital cost, its environmental

benefits, and its compatibility with future construction of NFCCR. YTID water that is currently diverted from the Tieton River would remain in the river to its confluence with a Naches River, approximately 15 additional miles, where it would support Endangered Species Act listed fish species and their habitat. The existing YTID Tieton River diversion and fish screens could be removed, which would enhance fish passage and reduce fish mortality.

Alternative 5 would provide a highly reliable water supply for YTID. The Wapatox alternative is independent of YTID's existing canal, so the project could be constructed during the summer months without risk of interfering with YTID water deliveries. After the completion of the Wapatox Project, if YTID chose to continue maintaining the existing Tieton Canal, the canal could serve as a redundant, backup water supply for YTID. The redundant canal would effectively eliminate the risk of loss of water service to YTID. Alternative 5 is also compatible with the short-term or long-term implementation of NFCCR. The main significant disadvantage of Alternative 5 is its high annual O&M cost. The high O&M cost is primarily the result of power costs to pump water to FCR. YTID would need federal, state, or local funding assistance from Basin stakeholders in the form of capped power rates, construction grants, and/or no-interest loans to make this project financially feasible for the District.

Another option available to YTID is the construction of a full-capacity Wapatox and NFCCR facility (Alternative 6A). In addition to the benefits of Alternative 5, Alternative 6A would also provide significant added benefits to basin stakeholders in the form of additional storage, additional water supplies, operational flexibility, and potential for water market reallocations. However, the cost and support required from external stakeholders is also significantly greater.

Recommendations and Next Steps

To assist YTID in choosing one of these alternatives and in beginning to implement the selected project, the following actions should be considered:

Initiate National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA) Compliance—Initial steps toward Environmental Assessment (EA) or Environmental Impact Statement (EIS) and permits needed for construction. NEPA/SEPA documentation and the process involved in preparing it will help identify the best alternative, or help confirm that the alternative YTID prefers complies with state and federal requirements. It will also detail mitigation requirements for potential cultural or environmental impacts and conditions, or stipulations for construction that need to be incorporated into design plans and specifications.

- Develop purpose and need statement.
- Develop more detailed project descriptions.
- Identify lead State and Federal agencies and meet with them to determine appropriate level of NEPA analysis (EA or EIS).
- Identify the field investigations that should be conducted and what level of detail will be needed for the selected NEPA/SEPA document.
- Coordinate with Integrated Plan Hydrologic Modeling Efforts - Carefully characterize the alternatives being considered, and their potential interaction with the operations and hydrology of the Tieton River, Naches River, and potentially-affected reservoirs both upstream and downstream of YTID's project(s).
- Meet with YTID Landowners – A public meeting for YTID landowners should be held to update them on the alternatives being considered, the process YTID is following, and the timeline anticipated for NEPA/SEPA, design, funding, and construction.

- Initiate Tieton River Fish Study – Conduct a study to determine the potential benefit to the fishery of increased flows in the lower 15 miles of the Tieton River associated with Wapatox alternatives. This study could be used to solicit funding support from outside stakeholders.
- Investigate Power Supply for the Wapatox Project – Determine generally where the Wapatox alternative would connect to existing power facilities, the nature of the facilities to transmit that power to the pump station site, and the potential cost of this power.
- Geotechnical Investigations to Support Alternatives Selection – Conduct investigations including test pits, pumping tests for trench dewatering, and selected deep borings to better understand specific elements of pipeline, RCB, tunnel, and dam construction for the sake of estimating costs and selecting alternatives.
- Complete Core Drilling for NFCCR – Conduct investigations to get a better understanding of subsurface conditions at the dam site to help confirm the type and configuration of the dam itself, as well as key elements such as the foundation, spillway, and borrow materials. This effort should be conducted only if outside stakeholders are willing to support NFCCR.
- Investigate Acquisition of Right-of-Way for NFCCR – Assess the required steps and cost of potentially acquiring the land under the prospective NFCCR dam and inundation area.
- Increase Outreach to Integrated Plan Workgroups and Stakeholders – The best alternatives for long-term mitigation of risk to YTID’s water supply, factoring in both cost and noncost considerations, will likely require significant outside funding. These alternatives are well aligned with the Integrated Plan’s seven goals and objectives. Key Integrated Plan workgroups and stakeholders should be briefed on a regular basis in an effort to secure increased support and potential funding. Active participation in the Water Use and Habitat Enhancement Workgroups is highly recommended.

Introduction

1.1 Background

The Yakima-Tieton Irrigation District (YTID) delivers Tieton River water to approximately 27,900 acres of agricultural, industrial, and residential land northwest of Yakima, Washington. YTID was first organized as the Tieton Water Users' Association (TWUA) in 1906. All landowners were required to join the association and assign their water rights to the TWUA. Soon after the TWUA was formed, it entered into a contract with the U.S. government to design and construct irrigation conveyance and distribution facilities. The original distribution system consisted of a 12-mile-long Tieton Canal in the Tieton River canyon, as well as 320 miles of open canal distribution laterals. The first irrigation water was delivered in 1910.

During the late 1970s, YTID initiated a \$78 million Rehabilitation and Betterment Project, funded by the Bureau of Reclamation (Reclamation), the State Department of Ecology, and YTID. By 1986, the entire open canal distribution system downstream of the Tieton Canal had been replaced. The project included more than 230 miles of pipeline ranging from 4 to 90 inches in diameter, six booster pump stations, and two hydroelectric generating plants. The project also included the French Canyon Dam and Regulating Reservoir (FCR). However, the 12-mile-long Tieton Canal was not replaced because of high costs and the water users' limited repayment capabilities.

1.2 Project Purpose and Need

The Tieton Canal is now more than 100 years old, and is the only source of irrigation water for more than 4,000 users. Portions of the existing canal have failed numerous times because of age, unstable geology, and storm events. Canal failures disrupt the delivery of water and are costly to repair.

Many of the crops grown within YTID are high-value fruit trees that are subject to permanent damage from lack of water. The crops, primarily apples, cherries, and pears, represent a large portion of the local economy. YTID spends a significant amount of time and effort maintaining the Tieton Canal to maintain its reliability. The open canal creates a barrier and a hazard to wildlife and people. Deer, elk, and other animals are lost in the canal each year.

In response to these challenges, YTID is actively pursuing strategies to replace the canal or stabilize the reliability of its water supply, or both. Since 2013, CH2M Engineers, Inc. (CH2M) has been evaluating alternatives to help YTID determine the best course of action. Section 2 reviews these alternatives.

1.3 Purpose of this Study

The purposes of this study are to:

1. Identify and review four primary concepts developed in previous studies
2. Identify additional alternatives that are available through combinations of the original alternatives
3. Compare and evaluate alternatives using a common set of cost and non-cost evaluation criteria
4. Identify preferred alternatives and implementation strategies

Figure 1-1 depicts how overall project development has progressed to date, and future stages leading to construction.

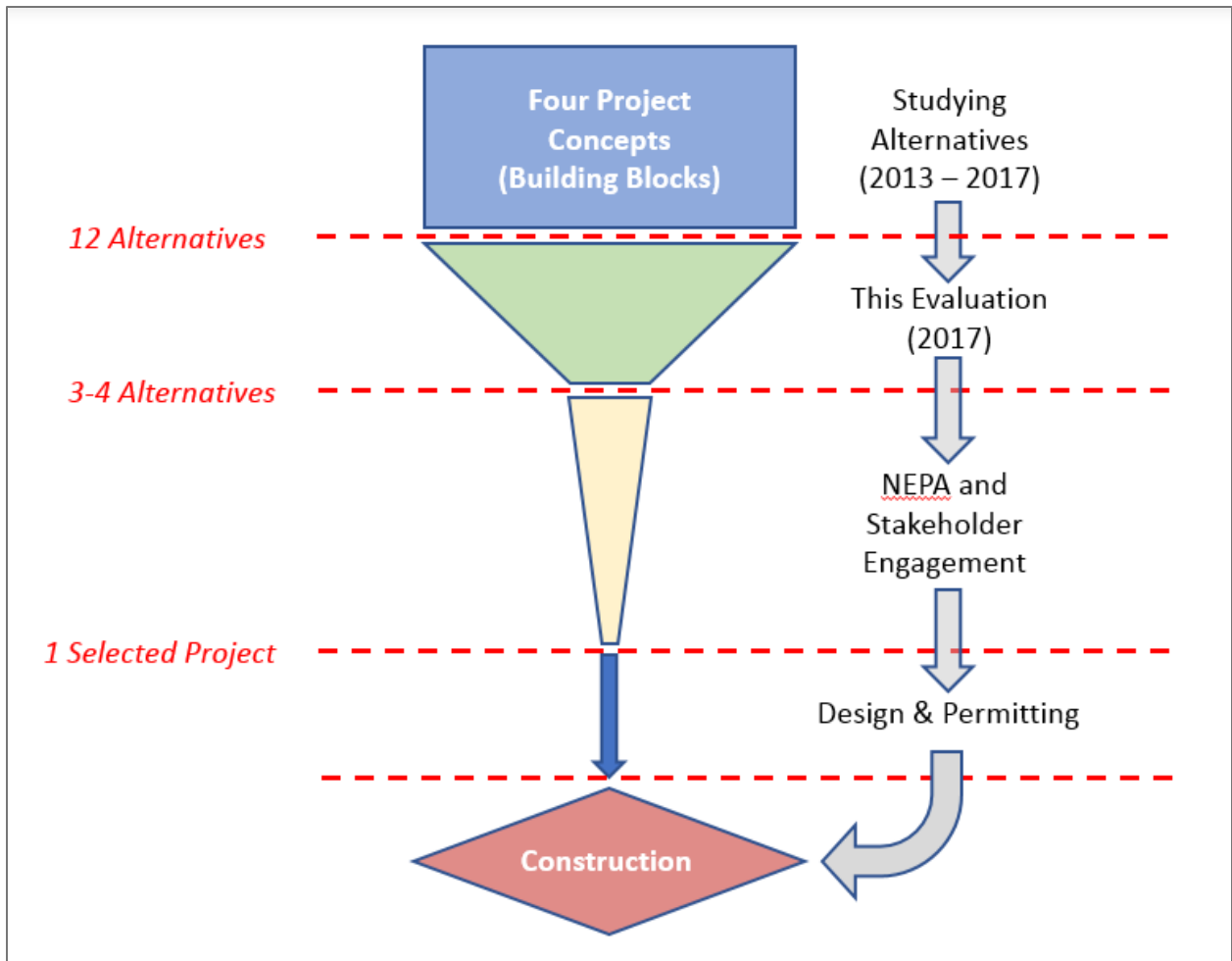


Figure 1-1. Progression of Project from Concept to Construction

Summary of Prior Analyses

2.1 Broad Project Concepts

Prior studies have focused on the following four distinct project concepts, summarized herein, to address YTID's project purpose and need:

1. Baseline Alternative (Canal Repair)
2. Tieton Canal Replacement
3. North Fork Cowiche Creek Reservoir
4. Diversion Relocation to Wapatox Diversion Dam (and associated conveyance system)

2.1.1 Baseline Alternative (Canal Repair)

CH2M and YTID developed a Baseline Alternative to repair the existing canal. The Baseline Alternative is considerably less costly than other alternatives. However, it will not provide the same reliability, risk reduction, longevity, capacity, or flexibility as the other alternatives being considered. Appendix A presents a detailed description of the Baseline Alternative, including repairs, improvements, and associated costs required to extend the useful life of the existing canal. The Baseline Alternative represents the minimum improvements required to extend the canal's life and maintain a viable water supply, potentially with minimal outside support or funding. It is expected that this would represent a one-time fix that could not be repeated to further extend canal life, and that eventually YTID would need to invest in full canal replacement or one of the other strategies.

In June 2017, a Baseline Alternative Workshop was held to discuss the alternative and obtain input from YTID. Consideration was given to structural deterioration, falling rocks and debris, cross-drainage facilities, slope stability, and wasteway functionality associated with the existing canal. Canal vulnerabilities were identified, and recommendations for prioritization of repairs or upgrades and alternatives for implementation were provided for the overall goal of reducing the canal's vulnerability and extending its life. The recommended improvements under this alternative were identified on a reach-by-reach basis and consisted of shoring eroded steep slopes with gabion walls, installing canal covers, replacing sections with 102-inch-diameter corrugated metal pipe sections, and sealing the canal with a flexible urethane type lining (possibly AquaLastic). One option for extending the canal's longevity would be to replace the canal's invert with a mortar lining. Based on the analysis, the mortar lining would reduce canal capacity. YTID has indicated that any reduction in capacity could significantly impact water deliveries, and therefore mortar lining is not recommended as part of the Baseline Alternative. Subsequent references to the Baseline Alternative in this report, and associated cost estimates, include the features described in Appendix A, with the exception of the mortar lining.

The total estimated cost for the Baseline Alternative is \$19.1 million (ACE International Class 5 estimate). This cost excludes design, construction management, and administration. Costs for permitting, legal support, land acquisition, and environmental mitigation are also excluded but may not apply with construction work limited primarily to the existing canal right-of-way.

2.1.2 Tieton Canal Replacement

In 2013, CH2M completed an alternatives study for replacing the Tieton Canal with combinations of box culverts, pipelines, and tunnels. The preferred alternative that emerged from the study consisted of the following:

- The installation of a new 6-foot-high by 10-foot-wide precast RCB that replaces the Tieton Canal from the Tieton River Diversion to the Windy Point Tunnel, and also replaces a section about 0.2 miles long downstream of the Windy Point Tunnel.
- The rehabilitation or reconstruction of the existing Windy Point Tunnel.
- The installation of a new 96-inch-diameter pipeline beginning at the end of the RCB and ending at the tunnel to FCR. The new pipeline would drop down the steep hillside from the end of the precast box section and parallel the Tieton River until it reaches the proximity of the existing tunnel that discharges into FCR.
- The construction of a new 96-inch-diameter tunnel connecting the new 96-inch-diameter pipeline to the FCR.

The preferred alternative had the best overall attributes considering environmental impacts, constructability, operations and maintenance (O&M), and cost. The design capacity of the preferred alternative is 370 cubic feet per second, which would provide YTID's peak demand, as well as some flexibility for water deliveries to others, including the Cowiche Creek Water Users Association. The total project cost estimate was \$137M (2013 dollars), excluding design, permitting, construction management, legal, administrative, land acquisition, and environmental mitigation costs. To avoid impacts to existing YTID water deliveries, construction on portions of the existing canal alignment would occur only during the winter months. CH2M estimated that permitting, design, and construction could take 8 to 10 years to complete after the alternative was selected and initiated.

In 2013, a 3-day-long Value Planning workshop was conducted to review and consider alternatives to the recommended concept. CH2M, YTID, Reclamation, and a local construction contractor participated in the Value Planning meeting. Fifteen variations of the original alternative were discussed and evaluated. Reclamation prepared a draft and final report, which validated CH2M's recommendations, and provided several cost-reduction considerations that could be implemented if YTID chose to proceed with this option.

2.1.3 North Fork Cowiche Creek Reservoir

In the fall of 2016, a *Draft North Fork Cowiche Creek Reservoir (NFCCR) Feasibility Study* (CH2M, 2016) considered a new and larger reservoir just upstream of FCR. The North Fork Cowiche Creek Reservoir (NFCCR) is a proposed off-stream water storage reservoir located approximately 0.5 mile upstream of FCR on the North Fork Cowiche Creek. This 35,000-acre-foot (AF) reservoir would increase available water supplies in the lower Yakima River Watershed and provide agricultural and environmental benefits consistent with the goals and objectives of the *Yakima River Basin Integrated Water Resource Management Plan* (Integrated Plan). The NFCCR concept would not replace the Tieton Canal, but could be combined with the Tieton Canal Replacement Alternative or other alternatives for increased water supply and flexibility. Even without addressing the canal directly, the NFCCR would provide a means of insurance against a canal failure, as follows:

- Backup water supply (assuming canal failure occurred during a period when NFCCR was not depleted)
- More time to repair the canal

With NFCCR in YTID’s system, storage volume that has historically been allocated in Rimrock Reservoir for YTID could be available to other downstream interests.

The total cost of NFCCR was estimated to be \$188M (2016 dollars), excluding design, permitting, construction management, legal, administrative, land acquisition, and environmental mitigation costs. Most of the construction could occur year-round without affecting existing irrigation operations.

2.1.4 Diversion Relocation to Wapatox Diversion Dam

In late 2016/early 2017, another project concept was evaluated that would replace the Tieton Canal and provide additional benefits. The “Wapatox Project” would include relocating the existing YTID diversion from the Tieton River to the Naches River near the existing Wapatox Canal and Diversion Dam. The project (described in *Feasibility Study - YTID Diversion Relocation to Wapatox Diversion Dam* [CH2M, 2017]) would rely on the existing Wapatox fish screen at the head of the Wapatox Canal, and would require a new pump station and approximately 3 miles of 96-inch-diameter tunnel and pipeline that would connect to the existing YTID main pipeline located approximately 0.7 miles east of FCR. In addition to replacing the existing YTID Tieton Canal, the Wapatox Project could also provide the following benefits:

- Remove the existing YTID Diversion Dam and fish ladder in the Tieton River.
- Effectively move the YTID diversion approximately 15 miles downstream. YTID water would remain in the Tieton River over its full length. Bull trout and steelhead would benefit from increased flow in this lower reach of the river.
- Potentially capture Bumping Reservoir spills and unregulated flows in the Naches River, thereby increasing the total available water supply and operational flexibility for YTID and other water users in the Yakima Basin.

The total cost of the Wapatox Project was estimated to be \$130M (2016 dollars), excluding design, permitting, construction management, legal, administrative, land acquisition, and environmental mitigation costs. Like NFCCR, most of the construction could occur year-round without affecting existing irrigation operations.

Figure 2-1 shows the locations of the Wapatox Project and the other concepts described in this section.

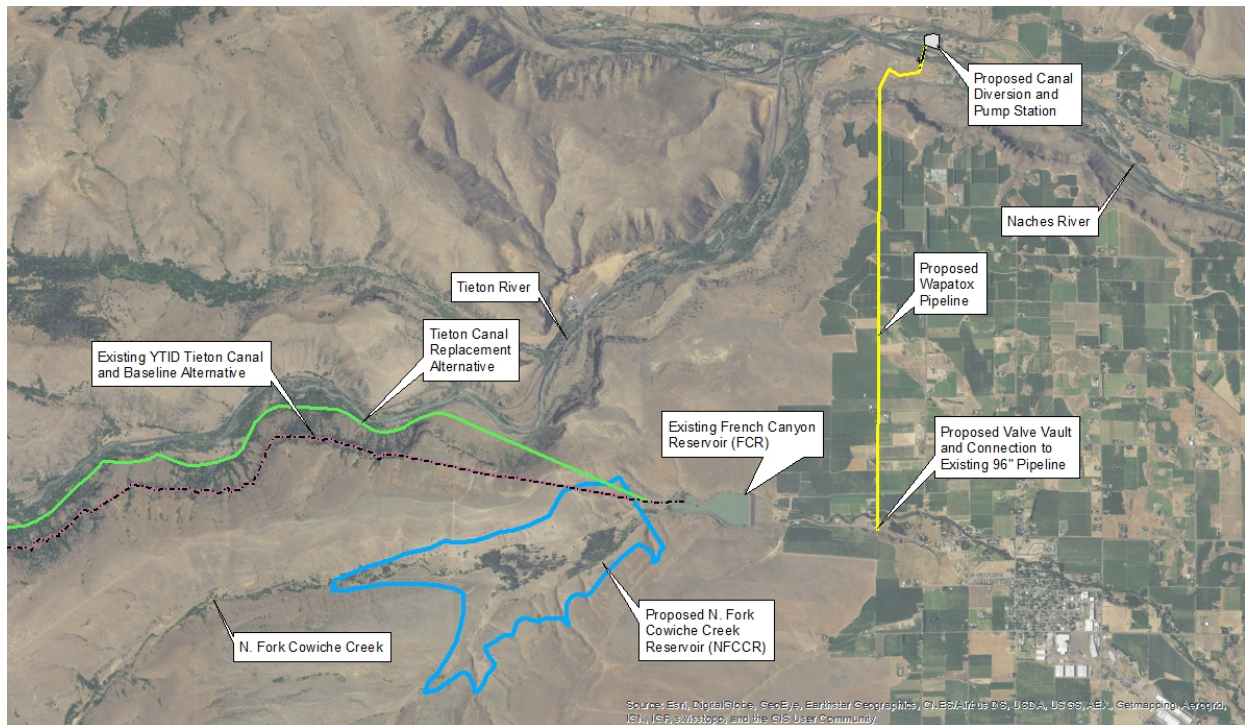


Figure 2-1. Project Area Map and Overall Project Concepts

2.2 Specific Project Alternatives

The project concepts described herein and developed during prior evaluations were generally stand-alone projects developed for peak delivery and storage capacity. To the extent possible, the alternatives are similar in terms of size and capacity. As part of this evaluation, CH2M has considered potential combinations of the various concepts, and optimized facility sizing, to expand the list of alternatives. The remainder of this report describes the process of formulating, screening, costing, and comparing these alternatives.

Alternatives Development and Screening

3.1 Criteria and Strategies

CH2M developed new alternatives based on the original four project concepts, as well as the following strategies.

3.1.1 Reliable Water Supply

Viable project alternatives must provide the capacity to deliver YTID's full water right (100,492 AF per year) to FCR or to the existing YTID main pipeline near FCR.

3.1.2 Distinct Characteristics and Benefits

When combining project concepts and formulating alternatives, the alternative must provide characteristics or benefits, or both, that differentiate it from other alternatives. For example, opportunities to save money on construction or operation, to simplify regulatory compliance, or to bring in other project partners provided justification to carry an alternative forward.

3.1.3 Technical Feasibility

This factor considers whether the differentiating elements of an alternative are technically feasible. For example, the NFCCR's maximum available storage capacity is 35,000 AF due to the topography of the reservoir. Alternatives that require more than 35,000 AF of storage were not considered. Alternatives that rely on the Tieton Canal (repaired or replaced) must not require it to operate during the winter because of potential challenges with ice at the headworks or in the canal system.

3.1.4 Institutional or Regulatory Feasibility

Alternatives that may encounter significant regulatory obstacles were not generally carried forward. Examples include scenarios that would likely require water rights transfers or obtaining additional YTID water rights.

3.1.5 Optimization

A major consideration when combining the project concepts was the ability to optimize facility sizes. This was primarily associated with combining NFCCR with various conveyance options. Storage at the NFCCR would allow canals, pipelines, and pump stations to be reduced in size, because it would no longer be necessary to deliver YTID's peak demand. Stored water in the NFCCR could be used to supplement peak deliveries supplied through the conveyance and pump stations. Optimization relied on development of a simple 1-year water balance to track the accumulation and depletion of storage and resulting capacity required in the conveyance system.

3.1.6 Phasing

Another key strategy involved bundling project elements that could be constructed in phases over a long period of time, in a "pay-as-you-go" approach. This may be a key strategy to better match construction costs with available funding, depending on the sources, timing, and magnitude of non-YTID funding.

3.2 Project Alternatives

Table 3-1 summarizes the overall list of twelve alternatives that were established using these criteria and strategies. This is followed by further discussions of each alternative and the findings during this stage of the evaluation.

Table 3-1. Summary of Alternatives Developed for Further Evaluation

Alternative No.	Name	Description ^a	Comments	Conveyance System Capacity (cfs)	NFCCR Capacity (AF)
1	Repair Existing Tieton Canal	Repair existing canal in its current location	<ul style="list-style-type: none"> See Appendix A for description of project facilities and cost estimates 	345	N/A
2a	Construct New Tieton Canal	Replace existing Tieton Canal with combination of new box culvert, 96-inch-diameter pipeline, and tunnel improvements	<ul style="list-style-type: none"> Project facilities and cost estimates are described in CH2M, 2013 	370	N/A
2b		Construct same alternative as (2a), but with phased construction	<ul style="list-style-type: none"> Install downstream pipeline reach initially, then construct upstream box culvert reach 30 years later 	345-370	N/A
3	Combination of Repair and Replacement of Tieton Canal	Replace downstream reach with new pipeline; repair existing upstream reach	<ul style="list-style-type: none"> The existing canal below Windy Point Tunnel would be replaced with a 96-inch-diameter pipeline, and the existing canal upstream of Windy Point tunnel would be repaired using the Baseline Alternative 	345-370	N/A
4	Construct NFCCR Only	Construct new dam and 35,000-AF reservoir	<ul style="list-style-type: none"> Project facilities and cost estimates are described in CH2M (2016) 	370	35,000
5	Construct Wapatox Pump Station and Pipeline Only	Construct new pump station on the Wapatox Canal and new 3-mile-long, 96-inch-diameter pipeline	<ul style="list-style-type: none"> Project facilities and cost estimates are described in CH2M (2017) 	345-370	N/A
6a ^a	Construct Wapatox Pump Station and Pipeline with NFCCR	Combine full-capacity Wapatox project with full-capacity NFCCR (includes Naches River release)	<ul style="list-style-type: none"> Provides opportunity to maintain full reservoir year-round for carry-over storage or fill the reservoir more than once per year, or both 	345-370	35,000
6b		Optimize Wapatox project and NFCCR based on existing YTID water right; do not include Naches River release	<ul style="list-style-type: none"> 100,492-AF (YTID water right) lifted by Wapatox Water is delivered directly into distribution system or stored in NFCCR Existing Nov-March diversion restriction is maintained 	264	19,000
7a	Repair Existing Tieton Canal and Construct NFCCR	Repair existing Tieton Canal in its current location and construct full size NFCCR	<ul style="list-style-type: none"> Full-sized NFCCR Tieton River diversions restricted to March-October to avoid ice issues 	345	35,000
7b		Repair existing canal in its current location and construct smaller NFCCR	<ul style="list-style-type: none"> Optimized NFCCR size Tieton River diversions restricted to March-October to avoid ice issues Repaired canal would not need to flow at its capacity because of availability of storage 	345	19,000

Table 3-1. Summary of Alternatives Developed for Further Evaluation

Alternative No.	Name	Description ^a	Comments	Conveyance System Capacity (cfs)	NFCCR Capacity (AF)
8a	Repair Tieton Canal (upper reach) and Construct New Tieton Canal (lower reach) and NFCCR	Construct full-size Tieton Canal (lower reach), repair Tieton Canal (upper reach), and construct NFCCR	<ul style="list-style-type: none"> Full-sized NFCCR Tieton River diversions restricted to March-October to avoid ice issues 	345-370	35,000
8b	Construct New Tieton Canal (lower reach) and NFCCR	Construct smaller Tieton Canal (lower reach), repair Tieton Canal (upper reach), and construct NFCCR	<ul style="list-style-type: none"> Optimized NFCCR size Tieton River diversions restricted to March-October to avoid ice issues Repaired canal would not need to flow at its capacity because of availability of storage 	264	19,000

^a Water recipients for all alternatives include YTID. Water recipients for Alternative 6a include YTID and potentially other downstream interests.

3.2.1 Alternative 1 – Repair Existing Tieton Canal

As CH2M (2017) discussed, this alternative repairs the existing canal in place, using a combination of the following construction elements in specific reaches:

- Shoring eroded steep slopes with gabion walls
- Installing canal covers
- Relining sections of the canal with 102-inch-diameter corrugated metal pipe
- Sealing the canal with a flexible urethane lining such as AquaLastic
- Replacing the canal’s invert with a mortar lining

As mentioned, this alternative would initially cost considerably less than all other alternatives, but would not provide the same reliability, risk reduction, longevity, capacity, or flexibility as the other alternatives being considered. It represents the minimum improvements required to nominally extend the canal’s life and to maintain a viable water supply, potentially without outside funding. Because of the short allowable construction season (to avoid impacts to deliveries), this alternative may have to be constructed over several consecutive years. This could result in a cost disadvantage due to decreased construction competition over time, along with increased mobilization costs. Further, it is assumed that after 30 years, YTID would need to invest in full canal replacement or one of the other alternatives described below.

3.2.2 Alternatives 2A and 2B – Construct New Tieton Canal

These alternatives represent the “Best Apparent Alternative” that emerged from the Tieton Canal Replacement evaluations in 2013, using a combination of precast concrete box culvert (upper reach), 96-inch-diameter pipeline and new tunnel (lower reach), tunnel rehabilitation, and new tunnel as described in Section 2. The “A” and “B” variations reflect potential phasing of construction. For Alternative 2A the full-scale canal replacement is included, for Alternative 2B, the lower reach (which is at greater risk) is repaired first and the upper reach (and the rehabilitated Windy Point) are repaired decades later or whenever funding is available.

These alternatives would provide a long-term fix and a nominal canal capacity increase, but they present several construction and permitting risks, discussed later in this report. Alternative 2A would likely

require YTID to find outside funding because its construction price is likely more than YTID's present budget. Alternative 2B, because of the deferral of portions of the work, may allow YTID to proceed without outside funding.

3.2.3 Alternative 3 – Combination of Repair and Replacement of the Tieton Canal

Alternative 3 is a hybrid of Alternatives 1 and 2, in which the upper reach of the existing canal is repaired per Alternative 1 and the lower reach is replaced per Alternative 2B. For this evaluation, the lower reach was assumed to be constructed at the same time as the upper reach (that is, it was not deferred as in Alternative 2B).

This alternative presents a compromise in cost and risk, saving money on the upper reach with less costly and less permanent repairs, but addressing the greatest-risk canal reach. It does, however, carry the construction and permitting risks of Alternative 2A in the lower reach. It also would require that eventually YTID replace the upper reach of canal with RCB, like the latter phase of Alternative 2B.

3.2.4 Alternative 4 – North Fork Cowiche Creek Reservoir

This alternative, as evaluated in CH2M (2016), entails constructing the NFCCR, which would be filled by pumping from FCR using water delivered through the existing Tieton Canal (or other alternative). This alternative would not address the condition of the existing Tieton Canal but would add up to 35,000 AF of storage to the basin. It would also provide a potential backup water supply (and additional repair time) for YTID should the canal fail, but would require significant annual pumping costs to fill the reservoir. Unless combined with other alternatives described herein, the additional stored water would not be available to water users other than YTID or those connected to YTID's system. However, having the NFCCR would allow YTID and Reclamation to move stored water from Rimrock Reservoir to NFCCR early in the spring, which would free up more storage space in Rimrock for other water users downstream on the Naches or Yakima Rivers.

3.2.5 Alternative 5 – Wapatox Pump Station and Pipeline

This alternative, as evaluated in CH2M (2017), is a stand-alone project that would replace the Tieton Canal with a new pump station and pipeline. This alternative and others that involve the Wapatox Project offer the ability to access water from both the Tieton and Naches Rivers, and at a lower elevation which would be less subject to ice issues. This alternative potentially requires a point of diversion change. It would present fewer permitting and constructability risks than the Tieton Canal Replacement alternatives, but would require a significant investment in annual pumping costs, and YTID would likely need to find funding partners both for annual pumping and for the initial cost of construction. Because the Wapatox Project would consolidate river diversions and facilitate the rewatering of the lower 15 miles of the Tieton River, it may be an attractive concept to fisheries interests in the basin.

3.2.6 Alternatives 6A and 6B – Combination of Wapatox and NFCCR Projects

These alternatives combine Alternatives 4 and 5 either at their original sizes or optimized (made smaller) to capitalize on the ability to store water. Alternative 6A, as presented, is one of the only alternatives that provides potential water supply benefits to water users other than YTID. The storage and conveyance facilities in Alternative 6B, while less costly to construct and operate, are not sized or configured to store or release additional water. These alternatives both present fewer permitting and constructability risks than the Tieton Canal Replacement alternatives, but would require significant investment in annual pumping costs and would likely require YTID to find funding partners and secure long-term capped power rates. Because the combined Wapatox/NFCCR Project would consolidate river

diversions, facilitate the re-watering of the lower 15 miles of the Tieton River, and potentially include storage and water supply for other downstream agricultural or environmental interests, it may be an attractive concept for multiple basin stakeholders.

3.2.7 Alternatives 7A and 7B – Combination of Canal Repair and NFCCR Projects

These alternatives combine the NFCCR and Canal Repair (Baseline) alternatives. Alternative 7A includes the full-sized NFCCR, and Alternative 7B optimizes the size of NFCCR to only the storage volume needed for YTID. In Alternative 7B, although repaired at its existing size, the Tieton Canal would likely not flow at its peak capacity because the additional storage would allow diversions to be spread out over a longer period of time. These alternatives would not provide long-term water supply reliability to YTID because canal repairs (as described in Alternative 1) will only nominally extend the existing canal’s useful life. The NFCCR would provide a backup water supply (and additional repair time) for YTID should the canal fail, but would require significant annual pumping costs to be filled. Although available river flows to divert to storage may be most available over the winter months, Tieton River diversions would generally need to be restricted to the March to October period to avoid potential ice issues and remain within the limits of YTID’s existing water rights.

Because of the shorter lifespan of canal repairs, selecting Alternative 7A or 7B would require that eventually YTID either replace the canal or implement the Wapatox project. For the purposes of assessing long term costs, it is assumed full canal replacement would be implemented in 30 years.

3.2.8 Alternatives 8A and 8B – Combination of Tieton Canal Replacement, Tieton Canal Repair, and NFCCR Projects

These alternatives combine the NFCCR and Canal Replacement alternatives, specifically replicating Alternative 3 in terms of repairing the upstream reach of canal and replacing the downstream reach with pipeline. Alternative 8A includes the full-sized NFCCR and full-sized new Tieton Canal, whereas Alternative 8B optimizes the size of the reservoir and canal to only that needed for YTID. These alternatives would provide long-term water supply reliability to YTID, but at a much greater capital cost, permitting risk, and constructability risk than Alternatives 7A and 7B. Although river flows to divert to storage may be most available over the winter months, Tieton River diversions would generally need to be restricted to the March to October period, to avoid potential ice issues and remain within the limits of YTID’s existing water rights.

Because of the shorter lifespan of canal repairs, selecting Alternative 8A or 8B would require that eventually YTID replace the upper reach of the canal, like the latter phase of Alternative 2B.

3.2.9 Other Observations and Considerations

Hydropower. YTID has expressed interest in the potential for hydropower generation associated with the Wapatox alternatives as a possible source of revenue using pumped storage at the existing FCR. However, CH2M’s investigation revealed that YTID is earning 3 cents per kilowatt hour (kWh) for power sales from its existing hydropower stations and 2.5 cents per kW for a capacity payment under the present power sales agreement for the in-line turbines. Any alternative that pumps water from Wapatox to FCR and returns it back to Wapatox would need to earn more from the sale of power (per AF) than it would cost to pump the water up the hill in the first place. This is highly unlikely. CH2M also investigated the option of only using the new Wapatox facility for hydropower generation, and not using it for pumping irrigation water to YTID’s system. This is probably feasible and economically justifiable, but it means dewatering the Tieton River and it is highly unlikely that the regulatory agencies would endorse such a concept. Therefore, hydropower alternatives were not considered feasible.

Water Rights. Other alternatives involving the NFCCR and the Wapatox facility could be developed that would further reduce the size of the conveyance facilities or divert and store water for other potential

downstream uses (such as other irrigation district demands or fish flow augmentation), or both. However, as described, for this analysis, the need to obtain new water rights or transfer ownership of current YTID water rights was assumed to be beyond the scope of this analysis. Similarly, ignoring the winter (November to March) restriction in YTID's current water right would allow the river diversion period to be extended and since Wapatox is a lower-elevation facility, significant water could be diverted and stored during the winter to reduce pump and pipeline sizes. But the analysis assumed the winter restriction could not be changed. A variety of permutations of the size and associated cost of the alternatives presented herein are available depending on the ability to partner with other water rights holders, develop new water rights, or develop scenarios where YTID's existing water rights could be transferred to others to the mutual benefit of YTID and other stakeholders.

Potential Downstream Beneficiaries. Although Alternatives 4, 7A, 7B, 8A, and 8B include NFCCR, they do not include a conveyance mechanism to return that water to the river systems late in the year. Alternative 6B has the required pipeline, but it is not sized (nor is the Naches River outfall provided) to facilitate returning water to the river. So as described, Alternative 6A is the only alternative presented that potentially provides water from NFCCR directly to other downstream interests. Other alternatives could be developed but would need to address the water rights issues described previously.

As described for Alternative 5, NFCCR could be filled with early runoff from Rimrock Reservoir, which would allow Rimrock Reservoir to store later runoff. This additional stored water in Rimrock Reservoir increases the total water yield in the basin. The new water could be used later in the year in the Naches or Yakima Rivers for agricultural, municipal, or fish passage/fish habitat benefits.

Reservoir Fish Passage. One of the elements of the Integrated Plan is to improved reservoir fish passage. Any alternative that includes the Wapatox Project would provide the option to remove the YTID Diversion Dam, which has been a facility of concern for fish passage. However, it should be noted that for this report, the diversion dam removal has not been included in cost estimates.

Evaluation Criteria and Performance Measurement Factors

To select a preferred alternative, it is essential to identify a common set of evaluation criteria that can be used to measure and rank the options on a “level playing field.” Which attributes make an alternative favorable versus unfavorable, and how are the attributes measured? Cost is certainly an important consideration, but is by no means the only consideration. Non-cost factors are also vitally important. This section describes the criteria and performance characteristics identified as a means of comparing the alternatives.

4.1 Cost Factors

4.1.1 Capital Cost

Capital cost estimates prepared for this evaluation were based primarily on estimates prepared for the prior reports CH2M generated (year, 2013, 2016, and 2017), as described in Section 2. These prior estimates were Class 4 as defined by AACE International, prepared to aid in strategic planning, project screening, alternative scheme analysis, economic or technical feasibility confirmation, and preliminary budgeting for proposed projects. This type of estimate is prepared based on limited field and design-specific information, where the conceptual engineering is less than 15 percent complete. Costs include general conditions and contractor overhead and profit. Also included is a 30 percent contingency for the project facilities. The contingency allowance is intended to account for changes in the project scope and items that have not been defined at the conceptual level of project design. Unless otherwise indicated, no costs are included for land acquisition, administrative, legal, financing, engineering, construction management, environmental analyses and mitigation, or permitting.

As new alternatives were formulated, cost estimates were developed primarily using scaling factors for situations where project facilities were combined and facility sizes optimized. For example, on alternatives that combine NFCCR with new pipelines that could be optimized to a smaller diameter, the prior pipeline costs were adjusted down based on a ratio of diameters. Wapatox pump station costs were adjusted by scaling mechanical/structural/electrical components based on ratio of design flows. For alternatives with a smaller NFCCR, dam costs were adjusted by generating new quantities. However, because most of the revised cost estimates were scaled from the prior Class 4 estimates, these revised estimates should be considered Class 5.

4.1.2 Annual Operation and Maintenance Costs

Like capital costs, O&M costs for this evaluation were based on estimates prepared for prior reports, and scaled where appropriate for modified facility sizes. Typical O&M costs, excluding the cost of power, are based on a percent of the capital cost for each facility and are expected to account for general upkeep, repair, and replacement of minor items, and normal efforts required to inspect and monitor the facility, as well as to keep it in good condition and functional (including such tasks as periodic painting and cleaning, or lubrication). Factors were developed from past project experience and are expected to be conservatively high.

Annual power costs assume \$0.05/kWh for pumping for Wapatox alternatives and \$0.10/kWh for NFCCR, and 80 percent pumping efficiency. Also included is a specific operational estimate at 2 full-time-equivalent employees for the full year for each pump station. It is recognized that the facility will not be

functional the entire year, but there will be 24-hour operation required for portions of the year by more than one staff member.

4.1.3 Deferred Construction and Rehabilitation/Replacement Costs

Certain alternatives defer construction of portions of the project, as a potential means to better align with initial funding. Estimates of cost for the deferred portions are simply escalated to reflect inflation over a 30-year period (the assumed length of the deferral).

For the canal repair alternatives, it was assumed that after 30 more years (even with the comprehensive repairs described), the canal would have to be replaced by new facilities, specifically new RCB and pipeline. This approach was based on the recognition that by that time, the canal would be approaching 140 years old and likely not suitable for a repeat of the repair work. For alternatives that only repaired a portion of the canal and replaced the remaining reach, only the repaired portion would be subject to replacement costs after 30 years.

Rehabilitation/replacement costs represent the need to intermittently invest in either significant rehabilitation (or refurbishment) or complete replacement of major equipment, such as pumps and other mechanical and electrical gear. This could include repairing or replacing impellers, machining shafts, replacing seals and bearings, rewinding motors, and refurbishing electrical equipment. The frequency of this investment will vary from perhaps every five years to every 20 or 30 years, depending on the type of equipment, typical operating conditions, and consistency of annual maintenance.

4.2 Non-cost Factors

A number of non-cost project characteristics related to construction, regulatory approval, irrigation operations, stakeholder acceptance, and implementation phasing provide an important contrast between alternatives. The non-cost factors considered in this evaluation are summarized as follows.

4.2.1 Constructability

Several factors will affect the cost and duration of construction. Most will ultimately be accounted for in cost estimates, but during an early-stage evaluation such as this one, it is difficult to adequately account for constructability issues in estimates, because no detailed surveying, mapping, drilling, or design has been performed. Nevertheless, constructability attributes of various projects can be compared on a qualitative basis. Projects that are difficult to construct have greater potential for unknown or unaccounted costs, project delays, claims, and change orders. Each of these factors represent risk to YTID. Therefore, constructability impacts should be considered as part of non-cost characteristics.

Construction Access/Staging – This criterion provides a relative assessment of the ease or difficulty of getting heavy construction equipment into work areas. The criterion is measured by proximity to suitable roads and bridges, and satisfactory lay-down areas for temporary storage of materials and equipment. An example of a favorable rating for this criterion is a project located near a well-maintained county road or highway. An unfavorable rating might involve a project that requires construction of new access roads or bridges for work in remote locations.

Construction Duration/Timing – This evaluation criterion is generally driven by whether a given alternative can be constructed year-round without major limitations due to weather conditions, existing land use, or irrigation operations. For example, any project that can be constructed during long, warm summer days will be favored over a project that must be constructed during the winter, when snow, ice, cold temperatures, and short days will hinder construction.

Topography/Terrain – Topography and terrain will have a significant impact on construction cost and speed. This criterion provides a measure of the ease or difficulty of construction based on the physical

characteristics of the work area. Alternatives located on flat, open terrain will be more favorable than projects located on steep, rugged terrain, or projects that cross incised drainage or river crossings.

Right-of-way Acquisition – Upon completion of the project, YTID will need a permanent right-of-way to access and maintain the canal or pipeline. Temporary rights-of-way will also be needed during construction. This evaluation criterion provides a qualitative measure of the availability of right-of-way for construction and for permanent project access and maintenance. This criterion is typically measured or evaluated based on land uses and property ownership adjacent to the project. For example, a pipeline located within or adjacent to an existing right-of-way (such as a county road) will require less right-of-way acquisition compared to a project that traverses undeveloped terrain.

Impacts to YTID Operations – This evaluation criterion considers potential impacts on YTID operations and water deliveries. Maintaining water deliveries to YTID customers is essential. Therefore, any alternative that does not significantly affect existing YTID facilities during the irrigation season and requires less coordination to maintain YTID’s operations will be more favorable than alternatives that potentially prevent or delay water deliveries.

4.2.2 Institutional and Regulatory Compliance

These criteria are a qualitative assessment of potentially difficult permitting and regulatory issues for a particular alternative. Any unique permits or permits with extensive review periods or documentation requirements would reduce favorability. Specific cultural, environmental, or water rights elements that could be expected to generate opposition from permitting agencies or require significant mitigation time or cost during construction would also reduce favorability.

Wetland/Riparian Impacts – Wetlands and riparian habitat are protected by federal, state, and local regulations. Disturbing these features typically requires expensive and time-consuming mitigation, often at a 3:1 or 5:1 ratio for every impacted acre. This evaluation criterion considers the degree to which a given alternative is thought to disturb existing wetlands or riparian areas, requiring special mitigation measures or avoidance, or both. Less disturbance results in a more favorable rating.

Fisheries Impacts – The Tieton River is home to protected fish species, especially bull trout, steelhead, and Chinook salmon. This criterion evaluates projects that could disturb fisheries habitat during construction, or projects that could create habitat or fish passage benefits. Any project alternative that reduces existing fish passage or fish mortality issues would be considered favorable. For example, a project that eliminated a river diversion or fish screen, or a project that increases flow rates in the river, would be considered more favorable over an alternative that does not. Long-term habitat impacts (whether favorable or unfavorable) are considered more significant than short-term impacts that might occur during construction. A river crossing during construction may have a short-term negative impact on fisheries.

Cultural Resources – Federal law protects existing historic cultural resources. This evaluation criterion measures the degree to which a given alternative is thought to disturb existing resources, requiring special mitigation measures or avoidance, or both.

Water Rights – Projects that require a change to existing YTID water rights (including point of diversion, diversion timing, or increased diversion rate) would generally be considered less favorable than projects that do not affect YTID water rights.

Power Transmission/Consumption – Because YTID’s water supply has historically been a gravity system, there is the potential for alternatives relying on pumping to be viewed unfavorably by the environmental community. Related aspects include the generation of power (possibly at hydroelectric or coal-fired plants) at some other location to supply electricity to the pump station, and temporary and permanent impacts of new power transmission facilities over a miles-long corridor connecting to the pump station.

4.2.3 YTID Operations and Maintenance

These criteria consider the relative ease with which YTID staff can conduct routine operation and maintenance activities, how dependent the facilities are on O&M, and the overall operational flexibility of a given alternative's new equipment and facilities.

Operational Flexibility – This evaluation criterion is used to measure several operational flexibility attributes. Alternatives that access flow in both the Tieton and Naches Rivers provide an opportunity to capture more annual volume, and provide more flexibility to access water at opportune times, depending on the water management of reservoirs on the rivers. Alternatives that divert water at lower elevations may be used to divert water year-round, whereas alternatives that rely on the higher-elevation Tieton Canal diversion would occasionally be restricted by ice and are not well-suited to winter operations. Buried pipeline alternatives would generally remain free from icing conditions and be better suited to year-round operations than to an open canal system, which would quickly freeze during cold weather. Finally, pressure pipeline alternatives would have quicker response times than open canals, and are more favorable for adjusting flow rates to match changing supply and demand.

O&M Access – This criterion considers the ease of accessing project facilities for O&M work. Facilities in difficult or remote terrain would be less favorable.

O&M Complexity – Facilities like pipelines and tunnels are inherently less complex to maintain. Pump stations, large valve stations, and related equipment, by contrast, are much more difficult and costly to maintain and would be viewed as less favorable.

O&M Vulnerability – Certain alternatives have facilities that are much more dependent on O&M and would be more vulnerable to failure should O&M be interrupted or discontinued for some period of time. Pipelines and tunnels, for example, are not particularly vulnerable and will operate successfully for years with little or no O&M. Pump stations, however, depend on a robust and uninterrupted O&M program to ensure consistent operation, and would be viewed as less favorable.

Ability to Repair/Fix, and Required Frequency – This evaluation criterion considers the safety aspects and degree of difficulty for repairing or replacing equipment and facilities, and how often those repairs would be expected to be required.

4.2.4 Reliability

These criteria consider the short- and long-term reliability and redundancy of each alternative's facilities in terms of the overall project's purpose and need.

Short-term and Long-term Reliability – This evaluation criterion considers the alternatives as they relate to reliable operations and facility life, including the proper function of equipment. It considers the longevity of facility and major components, their susceptibility to wear and tear or the elements, and the security of facilities. For example, a gravity water supply system is inherently more reliable than a pumped system. The distinction between short- and long-term reliability is most relevant to alternatives that are phased, or alternatives that have a shorter project life. For example, the Baseline Alternative provides short-term reliability by fixing problem areas, but the repairs are not considered sufficient to last as long as the other alternatives. Alternatives that defer portions of the improvements for many years may be less favorable with respect to short-term reliability.

Redundancy – Redundancy is an important reliability consideration. Alternatives that offer YTID more than one means to divert and deliver irrigation water are more desirable than alternatives that provide no backup. Examples include having adequate reservoir storage as a backup water supply in case a canal, pipeline, or pump station fails or needs emergency repairs.

4.2.5 Stakeholder Acceptance and Potential to Attract Funding Partners

This non-cost evaluation category is aligned with the seven elements of the Integrated Plan, a comprehensive approach to address a variety of water resource and ecosystem needs in the Yakima River Basin. The Integrated Plan was developed by a group of stakeholders representing the Yakama Nation, irrigation districts, environmental organizations, and federal, state, and local governments. It was selected as the Preferred Alternative in the Programmatic Environmental Impact Statement (EIS), and the Reclamation’s 2013 Record of Decision selected the Integrated Plan for implementation.

An alternative’s alignment with the Integrated Plan’s goals and objectives greatly increases the likelihood of stakeholder acceptance within the basin, as well as the likelihood of attracting funding partners; therefore, YTID alternatives that align with and support these goals are considered more favorable for this evaluation than alternatives that do not accomplish these goals. The seven elements are listed herein:

1. Reservoir fish passage
2. Structural/operational changes
3. Surface water storage
4. Groundwater storage
5. Habitat/watershed protection & enhancement
6. Enhanced water conservation
7. Market reallocation

4.2.6 Implementation Flexibility

These criteria assess a variety of factors related to how a given alternative would be contracted and delivered over time.

Phasing – Alternatives that provide the opportunity for incremental construction are desirable because of increased flexibility, relative to available funding and cash flow. An alternative that can be constructed in a “pay-as-you-go” fashion, over a long period of time, is more favorable compared to an alternative that would have to be completed up-front before it could be operated.

Compatibility with Future Buildout – This criterion considers whether a given alternative is compatible with a more comprehensive future project, or potentially limits opportunities for future projects. For example, the Wapatox Project is more compatible with the NFCCR project, compared to the Tieton Canal, because Wapatox has access to flow from two rivers and the ability to divert water year-round. If Yakima River Basin stakeholders wish to preserve the option to construct the NFCCR in the future, but not commit to the project at this time, the Wapatox facility would be the preferred project. Constructing the Tieton Canal could preclude future implementation of the NFCCR.

Potential for Alternative Delivery Models – Alternative project delivery (APD) models represent a variety of ways a construction project can be designed, constructed, financed, and operated that may provide the owner time savings, reduced risk, and more advantageous funding or financing options. Section 7 briefly describes potential APD models. Project alternatives that may match multiple APD models are scored as more favorable under this subcriterion. Typically, long linear projects that may have to be broken up into multiple seasons or separate pieces would not lend themselves as well to APD, or will neutralize some of APD’s benefits.

Financial Analysis

Table 5-1 summarizes the capital, O&M, rehabilitation/replacement costs, and deferred construction costs for the alternatives.

A financial model was developed to analyze YTID's future cash flow for each project alternative. The analysis provides per-share water rates under different financing and external cost sharing assumptions. In general, per-share water rates increase annually by 3 percent, independent of the capital improvement alternatives. This annual increase in per-share rate is to cover the assumed increase in YTID operating expenditures of 2.5 to 3.0 percent, depending on account. The number of shares and number of accounts are held constant throughout the analysis. The financial model addresses district finances from 2015-2100; Table 5-2 estimates per-share water rates from 2020 through 2050. This timeframe is the most helpful to focus on the financial impact of each capital improvement alternative.

Each alternative assumes a 2020 start date for both construction and financing, except for Alternative 1. Alternative 1 assumes no financing, with YTID paying for construction. Financing terms for all other alternatives are consistent: 4 percent interest rate, 30-year term, and 5 percent issuance fee. Appendix B provides additional information on annual budgets for each alternative.

O&M and power costs (where applicable) are assumed to begin for each alternative when construction is complete (generally assumed to be in 2025). The financial model assumes O&M costs escalate by 2.5 percent per year and power rates increase by 1.0 percent per year. The O&M escalation rate is based on the California Department of Transportation's future construction cost index. Power cost escalation is based on a conservative forecast of future hydropower wholesale prices. In-district cash reserves are assumed to earn a return of 1 percent annually. The financial model is capable of additional analysis that varies the assumed escalation rates, financing terms, and cost-sharing agreements. This analysis focuses on the impacts from different levels of external cost-sharing on both capital costs, and on annual O&M only.

Rehabilitation/replacement costs are assumed for this analysis to apply every 20 or 30 years. As described above, some of this investment will occur more frequently but the analysis was simplified by allocating sufficient funding into Year 30.

Table 5-2 describes each alternative and for each, provides a graph of per-share price over time. The graphs demonstrate the impact to per-share rates under different cost sharing agreements. The cost share agreement assumed in these figures partners on both the initial capital cost and the annual O&M costs. External partners could include Reclamation, the U.S. Department of Agriculture, the Washington Department of Ecology, the Washington Recreation and Conservation Office, or regional partnerships in the Yakima basin. The analysis does not identify specific external funding partners for each alternative, although partnerships are more likely to occur for alternatives that are aligned with Integrated Plan goals. The analysis varies the cost-sharing with external partners, including 100 percent YTID-funded, 75 percent YTID-funded, 50 percent YTID-funded, and 25 percent YTID-funded.

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Table 5-1. Summary of Costs for Each Alternative

Alt	Description	Prior Estimate of Construction Cost ^a	Year of Initial Estimate	Construction Cost at Mid-Point of Construction (2022)	Estimate of Total Initial Project Capital Cost ^b	Rehabilitation/ Replacement Costs or Deferred Construction (as noted)				Comments and Assumptions		
						2025	2025	20 years	30 years			
						O&M	Power	2042	2052			
1	Repair Existing Tieton Canal	\$19,100,000	2017	\$21,600,000	\$27,600,000	\$70,000				\$416,200,000 (deferred construction)	Assumes Baseline Alternative is implemented over 5 years beginning in 2020 (see Appendix A). Replacement cost consists of implementing full Tieton Canal replacement after 30 years.	
2A	Replace existing Tieton Canal with combination of new box culvert and 96-inch pipeline	\$137,000,000	2013	\$171,100,000	\$219,000,000	\$180,000						Project facilities and capital costs are described in CH2M HILL, 2013
2B	Same as (2A), with phased construction. Pipeline is constructed in 2020 and box culvert in 2050.	\$76,700,000	2013	\$95,800,000	\$122,600,000	\$100,000				\$202,200,000 (deferred construction)	Project facilities and capital costs are described in CH2M HILL, 2013. Assumes 96-inch pipeline downstream of Windy Point Tunnel is constructed beginning in 2020. Assumes upstream box culvert is constructed 30 years later. Costs assume existing upper canal remains in service through 2050.	
3	Replace downstream reach of Tieton Canal with new pipeline. Repair existing upstream reach	N/A	2013/ 2017	\$107,600,000	\$137,700,000	\$130,000				\$202,200,000 (deferred construction)	Project facilities and capital costs are described in CH2M HILL, 2013. Assumes 96-inch pipeline downstream of Windy Point Tunnel is constructed beginning in 2020 and Baseline Alternative is implemented for upstream portion of canal starting in 2020. Replacement cost consists of implementing full Tieton Canal replacement after 30 years for the upper reach of canal.	
4	Construct new dam and 35,000 AF NFCCR	\$188,000,000	2016	\$218,000,000	\$279,000,000	\$500,000	\$970,000	\$410,000	\$34,800,000 (R/R)		Project facilities and capital costs are described in CH2M, 2016. Power is for NFCCR pump station. R/R costs are for pump station electrical and mechanical equipment.	
5	Construct new pump station on the Wapatox Canal and new 3 -mile, 96-inch pipeline	\$130,000,000	2016	\$150,800,000	\$193,000,000	\$1,320,000	\$4,050,000	\$550,000	\$57,000,000 (R/R)		Project facilities and capital costs are described in CH2M, 2016. Power is for Wapatox pump station. Replacement costs are for pump station structural and mechanical equipment.	
6A	Combines full capacity Wapatox project with full capacity NFCCR (includes Naches River release)	N/A	N/A	\$359,800,000	\$460,700,000	\$1,820,000	\$5,020,000	\$960,000	\$91,800,000 (R/R)		Wapatox facilities and cost estimates are described in CH2M, 2017. NFCCR facilities and cost estimates are described in CH2M, 2016. Power costs are for pump stations at both Wapatox and NFCCR. R/R costs are for pump station mechanical and electrical equipment at both pump stations.	
6B	Smaller optimized Wapatox and NFCCR based on existing YTID water right	N/A	N/A	\$283,000,000	\$362,200,000	\$1,590,000	\$4,460,000	\$960,000	\$70,300,000 (R/R)		Wapatox and NFCCR cost estimates were adjusted using scale factors.	
7A	Repair existing canal in its current location and construct full size NFCCR	N/A	N/A	\$240,200,000	\$307,500,000	\$570,000	\$970,000	\$410,000	\$461,400,000 (R/R and deferred construction)		Assumes Baseline Alternative is implemented over 5 years beginning in 2020. Power and R/R costs are for NFCCR Pump Station, and there are also deferred construction costs for full Tieton Canal replacement after 30 years.	
7B	Repair existing canal in its current location and construct smaller NFCCR	N/A	N/A	\$184,300,000	\$235,900,000	\$500,000	\$400,000	\$480,000	\$442,900,000 (R/R and deferred construction)		Same comments as for Alternative 7A. NFCCR cost estimates were adjusted using scale factors.	
8A	Repair Tieton Canal (upper reach) and Construct New Full-Sized Tieton Canal (lower reach) and NFCCR	N/A	N/A	\$325,600,000	\$416,800,000	\$630,000	\$970,000	\$410,000	\$237,000,000 (R/R and deferred construction)		Alternative 8A is a combination of Alternatives 3 and 4. O&M costs are associated with both canal repair (upper reach) and canal replacement (lower reach) as well as NFCCR pump station. R/R costs are for NFCCR pump station equipment, and there are also costs for implementing full Tieton Canal replacement after 30 years for the upper reach of canal.	
8B	Repair Tieton Canal (upper reach) and Construct New Smaller Tieton Canal (lower reach) and Smaller NFCCR	\$215,100,000	mixed	\$254,800,000	\$326,100,000	\$550,000	\$400,000	\$370,000	\$185,700,000 (R/R and deferred construction)		Tieton Canal is replaced with 78-inch pipeline downstream of Windy Point Tunnel. Baseline Alternative is implemented for upper reach of canal. A smaller NFCCR (19,000 acre-feet) is also constructed. O&M costs are associated with both canal repair (upper reach) and canal replacement (lower reach) as well as NFCCR pump station (which also carries power costs). Replacement cost consists of NFCCR pump station equipment and implementing full Tieton Canal replacement after 30 years for the upper reach of canal.	

Notes:

^a Provides costs identified in original reports for these alternatives, dated 2013 to 2017. For hybrid alternatives, no prior cost estimates were provided.

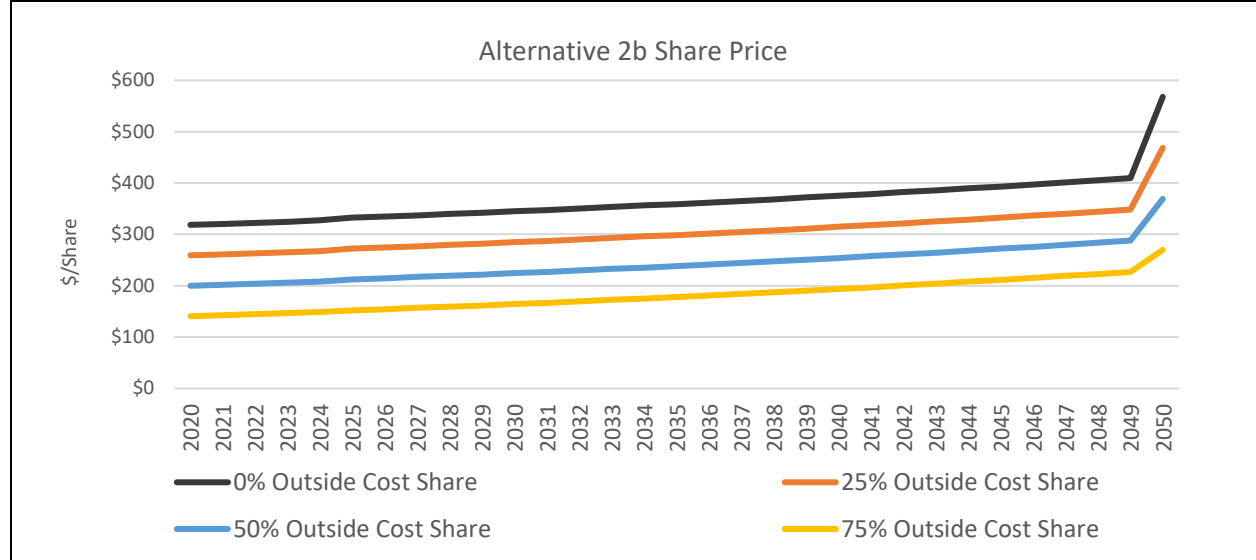
^b Includes design, permitting, construction management, legal, and administrative costs but excludes costs for land acquisition and environmental mitigation.

Table 5-2. Financial Analysis for Each Alternative

Alt.	Name	Description	Share Price
1	Repair Existing Tieton Canal	Repair existing canal in its current location (see Baseline Alternative described in Appendix A). After 30 years, implement full canal replacement.	An increase in share price is required during construction (2020-2025), then prices drop to cover O&M only. Share prices are less predictable than full replacement alternatives, due to canal age and deterioration.
<p>Alternative 1 Share Price</p>			
2A	Construct New Tieton Canal	Replace existing Tieton Canal with combination of new box culvert and 96-inch-diameter pipeline.	Construction is completed and new O&M begins in 2025. Share prices reflect 30-year financing (2020-2049). Share prices for this alternative (new facility) are more predictable than alternatives which rely on the existing canal.
<p>Alternative 2a Share Price</p>			

Table 5-2. Financial Analysis for Each Alternative

Alt.	Name	Description	Share Price
2B	Construct New Tieton Canal	Complete same alternative as (2A), but with phased construction. Construct pipeline in 2020 and box culvert in 2050	Phase 1 construction is completed and new O&M begins in 2025. Share price reflects Phase 1 30-year financing (2020-2049) and Phase 2 30-year financing (2050-2079). Share price assumes existing upper canal remains in service through 2050.



3	Combination Repair and Replace Tieton Canal	Replace downstream reach with new 96-inch-diameter pipeline. Repair existing upstream reach (Baseline Alternative). After 30 years, implement canal replacement for this reach.	Construction is completed and O&M begins in 2025. Share price reflects 30-year financing (2020-2049). Share prices are less predictable compared to full replacement alternatives due to upper canal age and vulnerability.
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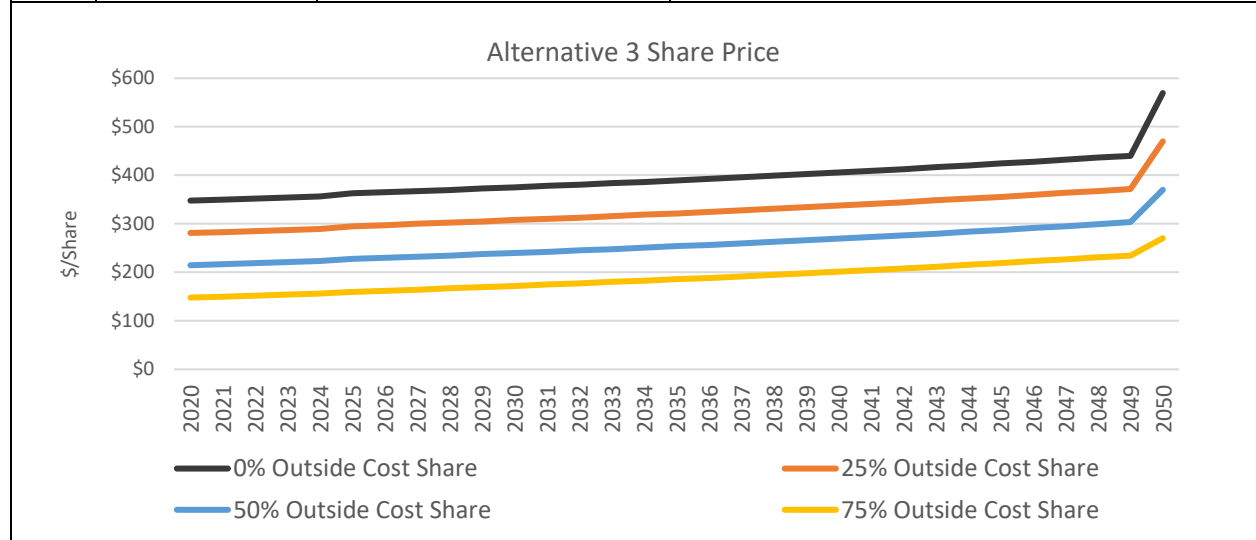
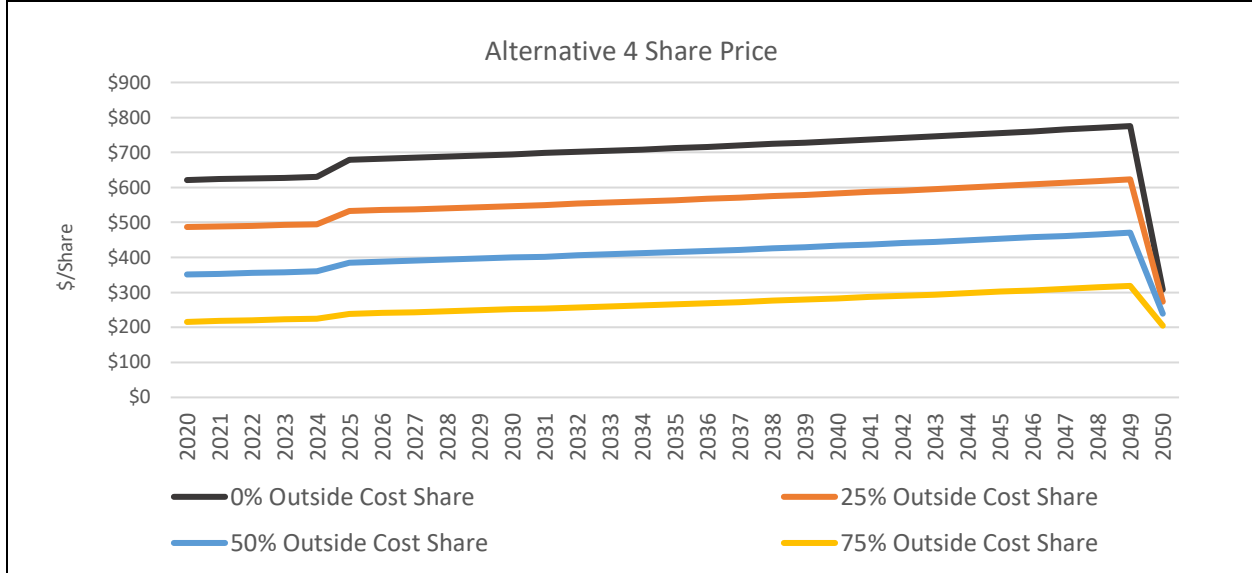


Table 5-2. Financial Analysis for Each Alternative

Alt.	Name	Description	Share Price
4	Construct NFCCR Only	Construct new dam and 35,000-AF reservoir.	Construction is completed and O&M begins in 2025. Share price reflects 30-year financing (2020-2049). Share prices are less predictable than other alternatives, due to canal age and vulnerability.



5	Construct Wapatox Pump Station and Pipeline Only	Construct new pump station on the Wapatox Canal and new 3.0-mile-long, 96-inch-diameter pipeline.	Construction is completed and O&M begins in 2025. Share prices reflect 30-year financing (2020-2049). Share prices for this alternative (new facility) are more predictable than alternatives that rely on the existing canal.
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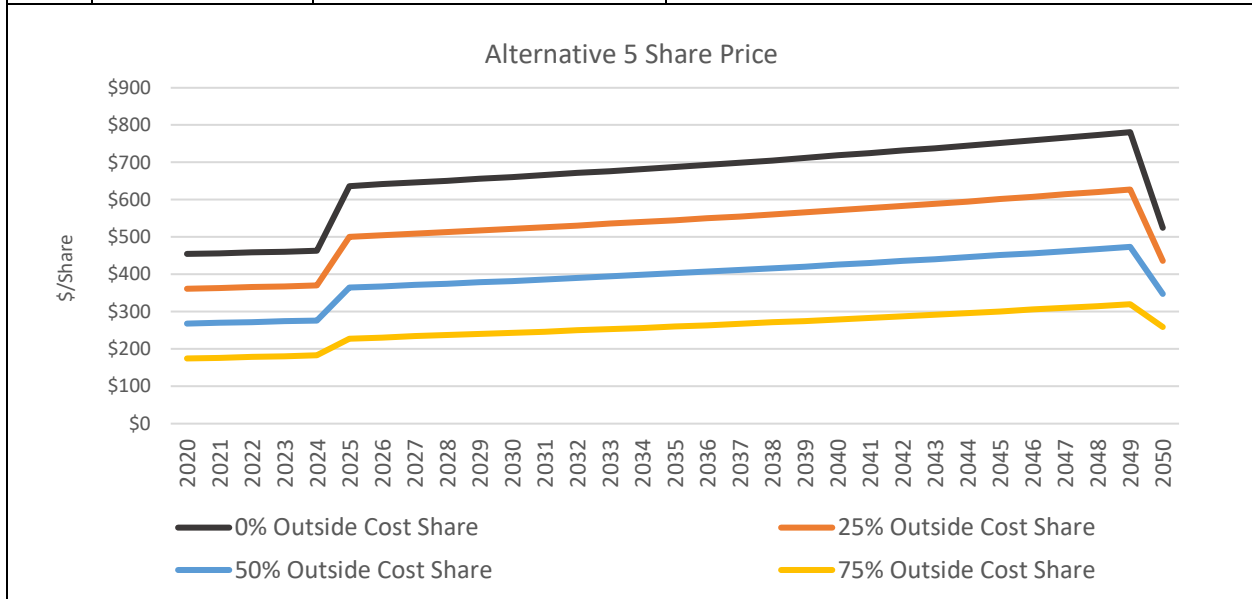
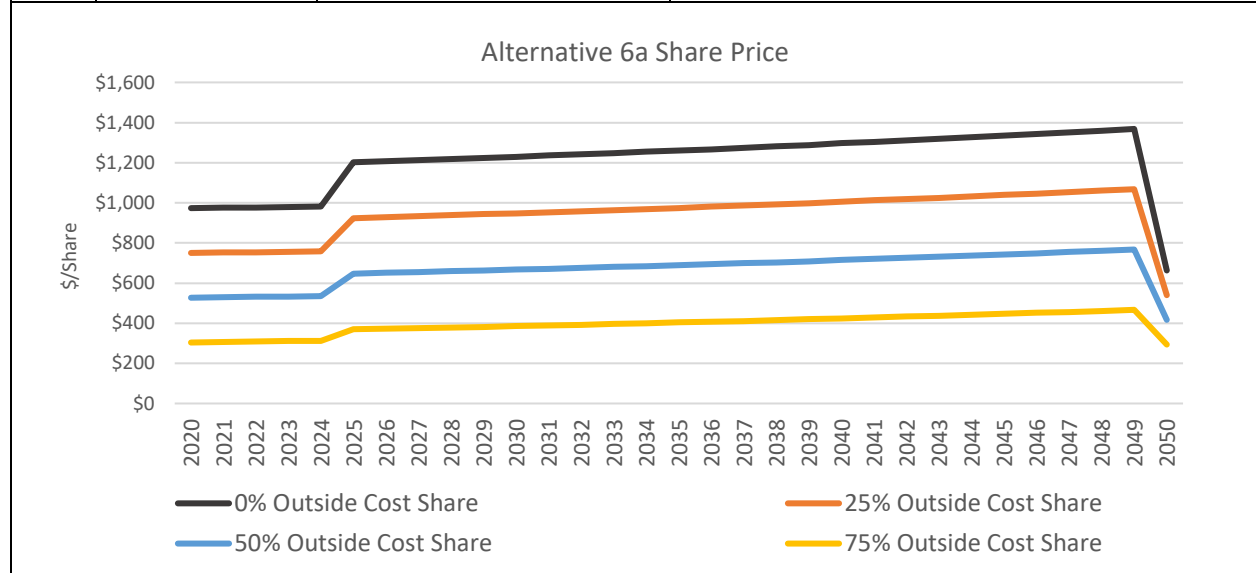


Table 5-2. Financial Analysis for Each Alternative

Alt.	Name	Description	Share Price
6A	Construct Wapatox Pump Station and Pipeline with NFCCR	Combine full capacity Wapatox project with full capacity NFCCR (includes Naches River release).	Construction is completed and O&M begins in 2025. Share prices reflect 30-year financing (2020-2049). Share prices for this alternative (new facility) are more predictable than alternatives that rely on the existing canal.



6B	Construct Wapatox Pump Station and Pipeline with NFCCR	Construct smaller, optimized Wapatox and NFCCR project based on existing YTID water right (no Naches River release)	Construction is completed and O&M begins in 2025. Share prices reflect 30-year financing (2020-2049). Share prices for this alternative (new facility) are more predictable than alternatives that rely on the existing canal.
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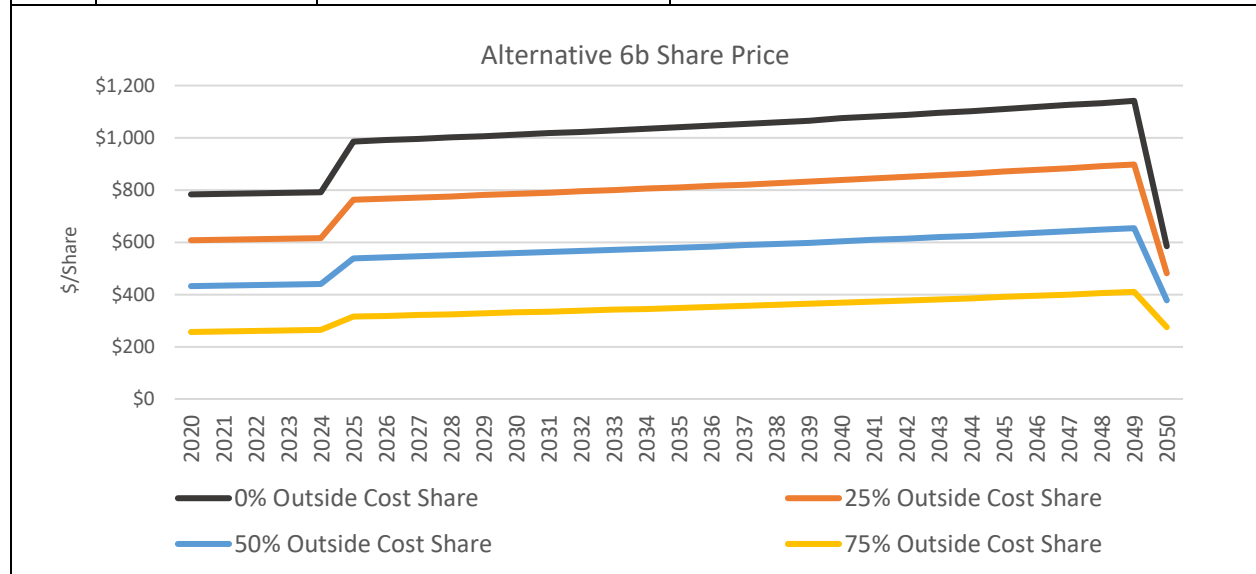
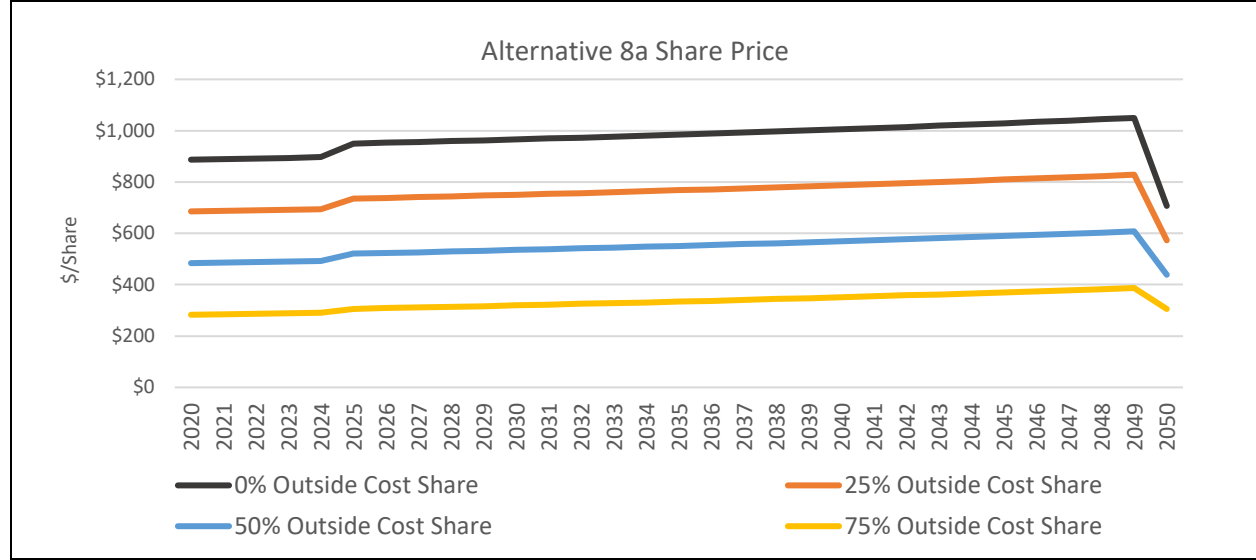


Table 5-2. Financial Analysis for Each Alternative

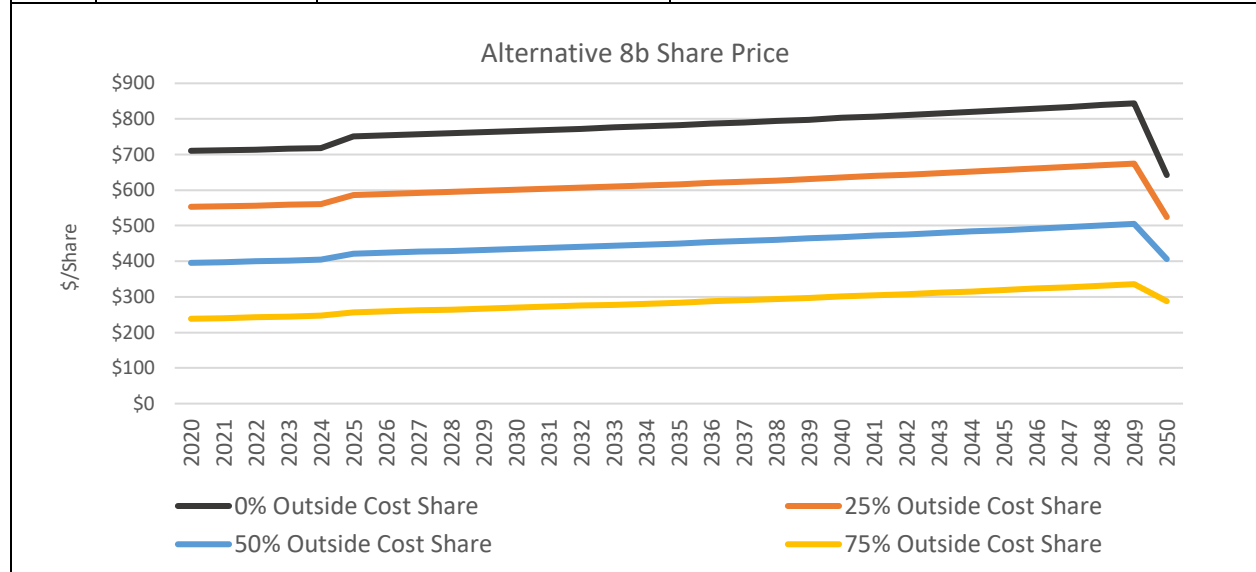
Alt.	Name	Description	Share Price																																																																																																																																																																
7A	Repair Existing Tieton Canal and Construct NFCCR	Repair existing canal in its current location and construct full-size NFCCR. After 30 years, implement full canal replacement.	Construction is completed and O&M begins in 2025. Share prices reflect 30-year financing (2020-2049). Share prices are less predictable than other alternatives, due to canal age and vulnerability.																																																																																																																																																																
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Table 5-2. Financial Analysis for Each Alternative

Alt.	Name	Description	Share Price
8A	Repair Tieton Canal (upper reach) and Construct New Full-Sized Tieton Canal (lower reach) and NFCCR	Construct full-size Tieton Canal (lower reach), repair Tieton Canal (upper reach), and construct NFCCR. After 30 years, implement canal replacement for upper reach.	Construction is completed and O&M begins in 2025. Share prices reflect 30-year financing (2020-2049). Share prices are less predictable than other alternatives, due to canal age and vulnerability.



8B	Repair Tieton Canal (upper reach) and Construct New Smaller Tieton Canal (lower reach) and Smaller NFCCR	Construct smaller Tieton Canal (lower reach), Repair Tieton Canal (upper reach), and Construct smaller NFCCR. After 30 years, implement canal replacement for upper reach.	Construction is completed and O&M begins in 2025. Share prices reflect 30-year financing (2020-2049). Share prices are less predictable than other alternatives, due to canal age and vulnerability.
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Non-cost Analysis

For the alternatives as presented in Table 3-1, CH2M applied the non-cost factors defined in Section 4 to render ratings of “less desirable”, “neutral”, and “more desirable” for the five broad categories as follows:

- Constructability
- Institutional and Regulatory Compliance
- YTID Operations & Maintenance
- Stakeholder Acceptance & Potential to Attract Funding Partners
- Implementation Flexibility

Table 6-1 provides a breakdown of the ratings for each alternative. In general, on a non-cost basis, any of the Alternative 6 options appear more favorable, and the least favorable are Alternatives 1 to 3. This is primarily driven by differentiators related to redundancy, reliability, stakeholder acceptance, and constructability.

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Table 6-1. Summary of Noncost Factors for Each Alternative

Alternative No.	Name	Description	Non-Cost Ratings										Overall Non-Cost Rating		
			Constructability		Institutional and Regulatory Compliance		YTID Operations & Maintenance		Reliability		Stakeholder Acceptance & Potential to Attract Funding Partners			Implementation Flexibility	
			- Construction Access/Staging - Construction Duration - Construction Timing - Topography/Terrain - Right-of-Way Acquisition - Impacts to YTID Operations		- Wetland/Riparian Impacts - Fisheries Impacts - Cultural Resources - Water Rights - Power Transmission/Consumption		- Operational Flexibility - O&M Access - O&M Complexity - O&M Vulnerability		- Short-term Reliability - Long-term Reliability - Redundancy		Seven Elements of YBIP: - fish passage - structural/operational changes - surface water storage - groundwater storage - habitat/watershed protection & enhancement - enhanced water conservation - market reallocation			- Phased Implementation - Compatible with Future Build-out - Potential for Alternative Project Delivery (APD) Methods	
1	Repair Existing Tieton Canal	Repair existing canal in its current location (Baseline Alternative)		Difficult construction access/staging, short construction window, potential impacts to YTID operations		May not require permits, minimal environmental impacts outside canal right-of-way		Extends life of existing canal but defers inevitable replacement. Slight capacity reduction and operational flexibility.		Reduces short-term risk. Not a long-term solution. Provides no redundancy.		Provides no new YBIP benefits		Not compatible with APD, and not likely to combine with other system improvements	
2A	Construct New Tieton Canal	Replace existing Tieton Canal with combination of new box culvert, 96-inch pipeline, and tunnel improvements		Difficult construction access and terrain. Requires winter construction with potential impacts to YTID operations		Difficult to permit. Significant environmental impacts and mitigation requirements.		Easier to operate and maintain. Gravity system		Reduces short-term and long-term risk		Provides minimal new YBIP benefits		No phased implementation. Less compatible with NFCCR. Limited suitability to APD due to permits and right-of-way acquisition.	
2B		Same as 2A, but with phased construction over a longer period of time		Difficult construction access and terrain. Requires winter construction with potential impacts to YTID operations		Difficult to permit. Significant environmental impacts and mitigation requirements.		Easier to operate and maintain. Gravity system		Relies on a portion of the existing canal for many years		Provides minimal new YBIP benefits		Phased implementation to match funding. Less compatible with NFCCR. Limited suitability to APD due to permits and right-of-way acquisition.	
3	Combination of Repair and Replace Tieton Canal	Replace downstream reach with new 96-inch pipeline. Repair existing upstream reach.		Difficult construction access and terrain, potential impacts to YTID operations		Difficult to permit. Significant environmental impacts and mitigation requirements.		Easier to operate and maintain. Gravity system. Extends life of upper canal but defers high cost replacement.		Relies on repaired existing canal long term		Provides minimal new YBIP benefits		Potential for phased implementation. Less compatible with NFCCR. Low suitability to APD due to permits and right-of-way acquisition.	
4	Construct North Fork Cowiche Creek Reservoir (NFCCR) Only	Construct new dam and 35,000 AF reservoir		Additional dam foundation drilling is required to determine constructability		No significant known environmental impacts.		Storage provides increased operational flexibility. Supply canal remains vulnerable.		Doesn't fix the Tieton Canal. Provides temporary water supply if NFCCR is full but not if empty		Provides structural/ operational changes, new surface storage, potential for groundwater enhancement, and market reallocation		Limited compatibility with Tieton Canal, better compatibility with Wapatox. Limited suitability to APD due to dam permitting	
5	Construct Wapatox Pump Station and Pipeline Only	Construct new pump station on the Wapatox Canal and new 3.0-mile-long, 96-inch pipeline		Complex, but most of the alignment is flat and accessible. No impacts to YTID operations.		Consolidates diversions, rewaters Tieton River, few environmental impacts		O&M intensive, large pump station		Low risk of loss of service. Provides redundancy in conjunction with existing canal		Improves fish passage, provides structural/ operational changes, enhances habitat		Compatible with APD and deferred construction of NFCCR	

Table 6-1. Summary of Noncost Factors for Each Alternative

Alternative No.	Name	Description	Non-Cost Ratings										Overall Non-Cost Rating		
			Constructability		Institutional and Regulatory Compliance		YTID Operations & Maintenance		Reliability		Stakeholder Acceptance & Potential to Attract Funding Partners			Implementation Flexibility	
			- Construction Access/Staging - Construction Duration - Construction Timing - Topography/Terrain - Right-of-Way Acquisition - Impacts to YTID Operations		- Wetland/Riparian Impacts - Fisheries Impacts - Cultural Resources - Water Rights - Power Transmission/Consumption		- Operational Flexibility - O&M Access - O&M Complexity - O&M Vulnerability		- Short-term Reliability - Long-term Reliability - Redundancy		Seven Elements of YBIP: - fish passage - structural/operational changes - surface water storage - groundwater storage - habitat/watershed protection & enhancement - enhanced water conservation - market reallocation			- Phased Implementation - Compatible with Future Build-out - Potential for Alternative Project Delivery (APD) Methods	
6A	Construct Wapatox Pump Station and Pipeline with NFCCR	Combines full capacity Wapatox project with full capacity NFCCR		Complex, but most of the alignment is flat and accessible. No impacts to YTID operations		Consolidates diversions, rewaters Tieton River, few environmental impacts		Storage provides increased operational flexibility. Two large pump stations are O&M intensive		Low risk of loss of service. Provides temporary water supply if NFCCR is full (redundancy)		Aligns with all YBIP goals except water conservation		Compatible with APD and deferred construction of NFCCR	
6B		Optimized Wapatox and NFCCR capacity based on YTID water right		Complex, but most of the alignment is flat and accessible. No impacts to YTID operations		Consolidates diversions, rewaters Tieton River, few environmental impacts		Storage provides increased operational flexibility. Two moderate size pump stations.		Low risk of loss of service. Provides temporary water supply if NFCCR is full (redundancy)		Aligns with all YBIP goals except water conservation		Compatible with APD. Limited flexibility due to smaller sized facilities	
7A	Repair Existing Tieton Canal and Construct NFCCR	Repair existing canal in its current location and construct full size NFCCR		Difficult construction access, short construction window, and potential impacts to YTID operations		No significant known environmental impacts.		Storage provides increased operational flexibility. One large pump station.		Relies on repaired existing canal long term		Provides structural/ operational changes, new surface storage, potential for groundwater enhancement, and market reallocation		Compatible with future construction of Wapatox. Limited suitability for APD	
7B		Repair existing canal in its current location and construct smaller NFCCR		Difficult construction access, short construction window, and potential impacts to YTID operations		No significant known environmental impacts.		Storage provides some operational flexibility. One moderate-size pump station.		Relies on repaired existing canal long term		Provides structural/ operational changes, new surface storage, potential for groundwater enhancement, and market reallocation		Limited compatibility with future construction of Wapatox due to smaller size reservoir	
8A	Construct New Tieton Canal and NFCCR	Construct full-size Tieton Canal (lower reach), repair Tieton Canal (upper reach), and construct NFCCR		Difficult construction access and terrain. Potential impacts to YTID operations		Difficult to permit. Significant environmental impacts and mitigation requirements.		Gravity canal. One large pump station		Reduces long term risk. Provides redundancy when NFCCR is full		Provides structural/ operational changes, new surface storage, potential for groundwater enhancement, and market reallocation		No phased implementation. Limited compatibility for APD.	
8B		Construct smaller Tieton Canal (lower reach), repair Tieton Canal (upper reach), and construct NFCCR		Difficult construction access and terrain. Potential impacts to YTID operations		Difficult to permit. Significant environmental impacts and mitigation requirements.		Gravity canal. One moderate-size pump station.		Reduces long term risk. Provides redundancy when NFCCR is full		Provides structural/ operational changes, new surface storage, potential for groundwater enhancement, and market reallocation		No phased implementation. Limited compatibility for APD.	

Project Delivery Alternatives and Issues

To date, a conventional design-bid-build delivery approach has been assumed for developing canal repair and replacement alternatives. However, as Section 4 noted, several APD models are available. APD provides a variety of ways that a construction project can be designed, constructed, financed, and operated, and may provide the owner time savings, reduced risk, and more advantageous funding or financing options. This section of the report describes the various ADP models available to YTID, as well as the advantages and disadvantages of each.

7.1 Potential Delivery Models

Table 7-1 is adapted from material in the *Water and Wastewater Design-Build Handbook (2016)*, prepared by the Water Design-Build Council, of which CH2M is a member. This material provides general definitions of several delivery methods, potential benefits, and other elements to consider.

Table 7-1. Delivery Method Attributes and Considerations

Delivery Method	Description	Benefits to Owner	Other Considerations/Potential Disadvantages
Owner Self-perform	After typically contracting with engineering firm to complete design work to level of detail needed, owner mobilizes its own staff to construct all or portions of the project	<ul style="list-style-type: none"> Likely least cost to construct applicable project elements Owner may be able to save some cost during engineering stage by not requiring the level of design detail that would be needed to hire a third party for construction Owner controls schedule 	<ul style="list-style-type: none"> Owner may not have adequate resources, equipment, or expertise for some elements of construction
Design Bid Build (DBB)	Owner first procures and contracts with an engineer to prepare detailed design plans and specifications, then contracts separately with a construction firm (usually on a low-bid basis) to construct the project, based on the design plans and specifications	<ul style="list-style-type: none"> Most common method for public works and major irrigation projects General understanding of cost and schedule for construction are known early in the design process and updated at multiple stages prior to advertising for construction contract DBB is often the lowest cost delivery method 	<ul style="list-style-type: none"> The owner may be responsible for compensating the construction firm for extra costs (increased risk) Contractor is usually selected based on low price which sometimes results in substandard quality and frivolous change orders Lack of single-point accountability Construction contractor does not have input during the design process

Table 7-1. Delivery Method Attributes and Considerations

Delivery Method	Description	Benefits to Owner	Other Considerations/Potential Disadvantages
Construction Manager at Risk (CMAR)	<p>Collaborative delivery method in which the owner retains an engineering firm and a CMAR firm</p> <p>During the design phase (under two separate contracts), one for design and one for construction; both firms participate in the design and construction phases of the project</p>	<ul style="list-style-type: none"> Facilitates contractor's direct input into the design, which may mitigate risk and/or reduce construction cost Simple and inexpensive procurement process based on qualifications, which can be completed in short timeframe Owner can elect to hire new CMAR firm after design phase if unable to reach consensus with initial CMAR firm on construction cost Better chance of designing to budget because estimates are developed by CMAR at several stages during the design 	<ul style="list-style-type: none"> Lack of single-point accountability, which increases potential for change orders during construction Cost for construction is not known at the time of initial contract signing Owner may need to facilitate collaboration between designer and CMAR firm Can require significantly more owner involvement
Progressive Design Build (PDB)	<p>The owner enters into a single contract with the designer-builder, who develops the design and open-book cost estimates to an approximate 60-90% level of completion, followed by a GMP or fixed price when design is complete. If the owner accepts the price, owner authorizes the DB firm to construct the project for that price.</p>	<ul style="list-style-type: none"> Can save time because design and construction overlap and construction approach can be customized to the contractor Single-point accountability for design and construction Allows more effective owner input into scope, features, and operational aspects Simple, inexpensive procurement can be completed quickly Flexibility to complete work based on available funding Owner can reject fixed price or GMP without causing significant delays in project Better chance of designing to budget because cost estimates are developed at several stages during design 	<ul style="list-style-type: none"> Cost and schedule for construction are not known at the time of initial contract signing An effective public education program may be needed to overcome concerns with construction price negotiation Procurement of long-lead equipment will be delayed until GMP agreement
Fixed Price Design Build (FPDB)	<p>A single fixed price, which encompasses both designing and constructing the project, is established when the contract is signed based on prior Owner investment</p>	<ul style="list-style-type: none"> Cost of design and construction is known at contract signing Schedule is fixed at contract signing Performance criteria and requirements are known when contract is signed Well suited for owners who are most interested in project performance with limited involvement in the design and construction process 	<ul style="list-style-type: none"> Procurement costs are high to both parties (Owner and D-B firm) because substantial design often needs to be completed prior to proposals Procurement process takes substantially more time Potential for reduced participation due to high proposal preparation costs Difficult to price, and inflation can be a major risk because designing and building a major facility can take several years

Table 7-1. Delivery Method Attributes and Considerations

Delivery Method	Description	Benefits to Owner	Other Considerations/Potential Disadvantages
Design Build Operate (DBO)	An extension to PDB or FPDB that encompasses long-term operation and maintenance of the completed project, where a DBO firm is typically selected on a best-value basis that emphasizes the project's entire lifecycle cost	<ul style="list-style-type: none"> The owner's role and final acceptance of the project do not conclude with delivery, but continue through to a defined operational term The DBO team—not the owner—assumes the risk for cost, performance, permit compliance, delivery capacity, and repair and replacement Well-suited to situations when an owner's staff resources are limited, or when an owner seeks to transfer operational performance risk 	<ul style="list-style-type: none"> Legislation, regulations, funding source, or other policies may govern whether a facility in a particular jurisdiction can be operated by an outside contractor There may be public resistance to a private firm operating a publicly owned asset Not all design-builders have the qualifications required to operate the facility The contract structure will be more complex when a design-build firm partners with a separate O&M firm
Design Build Operate Finance (DBOF)	An extension of DBO in which the single contract with a DBOF team includes project financing with various options for repayment over the contractual period	<ul style="list-style-type: none"> Owner's role and risk transfer similar to DBO May be suitable means of funding the project if owner's other funding sources are inadequate 	<ul style="list-style-type: none"> Considerations and potential disadvantages similar to DBO
Public Private Partnership (P3)	Integrates private financing support into one of the other CMAR or design-build delivery models	<ul style="list-style-type: none"> May be suitable means of funding the project if owner's other funding sources are not available Often include long-term O&M funding as well. Incentivizes P3 entity to be innovative 	<ul style="list-style-type: none"> Owner loses some control by being less prescriptive Probably costs more overall because owner pays for commercial financing, risk transfer, and profit

Notes:

GMP = guaranteed maximum price

7.2 Key Considerations

When properly planned and executed, collaborative delivery methods like CMAR, design-build (DB), and DBO offer advantages over DBB, most of which owners cite as resulting from the involvement of construction and operational personnel in the design phase. Because the design engineer and the design-build or CMAR firm work closely together beginning early in the design phase, they can identify and resolve potential constructability, schedule, and quality issues before field work begins.

Because construction can often begin before the design is complete, both DB and CMAR delivery have proven to be particularly effective for projects with tight schedule constraints. With DB, it is the use of a single procurement that helps save time. With CMAR, selecting the general contractor—who also serves as the owner's construction manager during design—early in the design phase saves time. The end result is the potential to reduce project costs through an efficient procurement, a compressed schedule, and the early integration of design and construction—all of which translate into constructability.

With DBB, the general contractor typically has no involvement in developing the design, and consequently the owner may face costly schedule, quality, or constructability issues during construction. However, much of this risk in a DBB model can be mitigated when design is:

- Performed by an engineering firm with significant experience on similar construction projects
- Completed by a firm that specializes in the technologies the project requires
- Accompanied by adequate investment during the design phase in:
 - Field investigations such as subsurface drilling, surveying, and bathymetry
 - Constructability reviews in which a construction contractor is brought in to provide expertise
 - Value engineering studies
- Accompanied by sufficient involvement of the engineer during construction as an owner’s agent to help ensure compliance with the contract and foresee problems before they arise or before significant costs or delays accrue
- Performed in conjunction with permitting and National Environmental Policy Act (NEPA) compliance activities to identify specific requirements at a suitably early stage (such as wetland and cultural surveys, Endangered Species Act compliance, and the like)

7.3 Selecting a Delivery Model

As YTID prepares to move ahead into future phases of the project, the delivery model will need to be determined when an alternative is selected (or possibly as part of selecting an alternative). This section demonstrates the primary advantage of all the APD models is the ability to engage a construction contractor much sooner. This can help reduce cost, reduce risk, and save time by leveraging the contractor’s expertise.

The primary benefit for PDB, FPDB, DBO, DBOF, and P3 is the potential to save time or implement alternate funding or financing. At present, accelerating the project does not appear to be a driver for YTID. Other means of funding or financing may be a driver, but it is important to note that none of these models are specifically geared toward reducing cost of construction or operation. The owner self-performing construction typically offers the least cost, but the owner may not have adequate resources, equipment, or expertise for some elements of construction. DBB typically involves construction by the lowest bidder, which may save cost if change orders are minimized (primarily achieved during the design process). The CMAR model may also save cost by means of contractor involvement during design.

One important consideration is the fact that YTID’s project is a long, linear construction project requiring NEPA/State Environmental Policy Act (SEPA) compliance, environmental permitting, and right-of-way acquisition that will take several years to complete. Many of the APD models are not well-suited to these circumstances because most contractors will want a clear understanding of cost and schedule early on, and will want to launch the project and begin to make a profit.

A reasonable approach for YTID to consider at this time would be to select an alternative and proceed into design, NEPA/SEPA, and permitting, and then re-assess the delivery model. Both CMAR and DBB could be successful in balancing risks and cost, and in either case a contractor could be brought on board during the design process in some capacity for input and expertise.

Conclusions

This investigation has demonstrated that YTID has at least 12 potentially viable alternatives for repairing or replacing the Tieton Canal and extending its useful life. Project cost estimates and non-cost attributes for these alternatives vary widely, and many alternatives are cost-prohibitive to YTID unless significant outside assistance is secured. It is also clear, however, that several of these alternatives provide significant benefits to the environment, as well as benefits to other Yakima Basin water users and stakeholders. Several alternatives are well-aligned with the goals and objectives of the Integrated Plan. Yakima Basin stakeholders may be willing to support a selected alternative to realize these benefits. The conclusions and recommendations presented herein are organized in terms of support levels from non-YTID stakeholders.

8.1 Alternatives that Require Limited Stakeholder Participation

Two options are available to the District that do not require significant outside stakeholder participation:

1. **Alternative 1, the Baseline Alternative, would repair the existing canal in its current location.** Although this alternative is both feasible and affordable, it would probably extend the life of the existing canal by only 20 to 30 years. The canal would remain vulnerable to failure from age deterioration and landslides. After 20 to 30 more years of operation, YTID would be faced with its current predicament, and even greater project costs and environmental obstacles to replace the canal. It is also important to note that after 20 to 30 more years of operation, YTID's 200-mile-long network of distribution pipelines downstream of FCR will be nearly 60 years old. Significant maintenance and replacement costs may be required to maintain current service levels from the pipelines. Any pipeline maintenance and replacement costs would be above and beyond the cost of replacing the Tieton Canal. This alternative is therefore not seen as a viable option for YTID.
2. **Alternative 3 would replace the downstream half of the Tieton Canal with a new 96-inch-diameter pipeline as soon as permits and funding were available.** In the absence of significant stakeholder participation, Alternative 3 may be YTID's best option. Alternative 3 would replace the downstream half of the Tieton Canal with a new 96-inch-diameter pipeline as soon as permits and funding were available. The upstream half of the canal would be repaired in its current location in the same fashion as Alternative 1. Alternative 3 would be beneficial to YTID because it would replace the most vulnerable half of the existing canal and extend the life of the remaining reach, at a total cost that may be within YTID's current available funding. Another advantage of Alternative 3 is gravity operation, similar to the existing canal, which would keep long-term O&M costs low. Disadvantages of Alternative 3 include difficult construction conditions, land-acquisition requirements, and significant permitting and environmental mitigation obstacles. The pipeline is located adjacent to the Tieton River, within high-value riparian habitat on federal, state, and private property. The new pipeline would not provide significant benefits to stakeholders outside of YTID, and is not as well-suited for the future implementation of the NFCCR. The new aqueduct would not have access to water from the Naches River, and would not be suitable for year-round operation due to winter icing and access conditions. Another disadvantage is that after 20 to 30 more years of operation, YTID would likely need to replace the upper reach of canal, meaning that the costs saved initially by only repairing this reach would be borne at a later date. Further, the initial repairs in the upper reach do not completely remove risks of failure.

Table 8-1 summarizes cost and non-cost attributes of Alternative 3.

Table 8-1. Cost and Noncost Attributes for Alternative 3

Alternative 3 – Replace downstream reach of Tieton Canal with new pipeline and repair existing upper reach			
Estimate of Total Project Capital Cost	2025 Combined Annual O&M and Power Cost	Advantages	Disadvantages
\$137,700,000 (2022) plus \$202,200,000 (2052) during second phase of construction	\$130,000	<ul style="list-style-type: none"> Aligns with available YTID cash flow May avoid need for external stakeholder funding Gravity operation is similar to the existing canal Annual O&M costs are low 	<ul style="list-style-type: none"> Significant environmental impacts and unknown environmental mitigation; new pipeline is located adjacent to the Tieton River in riparian habitat Difficult permitting and regulatory compliance Rugged terrain and winter construction (increased risk, cost) Construction could conflict with existing YTID operations Defers permanent solution to upper canal reach, leaving this reach at some risk Extensive land acquisition required Does not provide in-stream flow benefits to Tieton River or other benefits to Yakima Basin stakeholders

8.2 Alternatives that Require Significant Stakeholder Participation

If outside stakeholder participation and funding are available, several additional feasible and beneficial alternatives are available to YTID. Alternative 5 involves constructing the Wapatox pump station and pipeline. This alternative would replace the existing 12-mile-long Tieton Canal with a new pump station and 3-mile-long, 96-inch-diameter tunnel and pipeline. YTID's point of diversion would be moved from the Tieton River to the Naches River, using the existing Wapatox diversion and fish screen at the head of the Wapatox Canal. Alternative 5 is desirable because of its relatively low capital cost, environmental benefits, and compatibility with future construction of NFCCR. YTID water that is currently diverted from the Tieton River would remain in the river for approximately 15 additional miles, where it would support Endangered Species Act listed fish species and their habitat. The existing YTID Tieton River diversion and fish screens could be removed, which would enhance fish passage and reduce fish mortality.

Alternative 5 would replace the Tieton Canal and provide a highly reliable water supply for YTID. The Wapatox alternative is independent of YTID's existing canal, so the project could be constructed during the summer months without the risk of interfering with YTID water deliveries. After completion of the Wapatox Project, if YTID chose to continue maintaining the existing Tieton Canal, the canal could serve as a redundant, backup water supply for YTID. The redundant canal would effectively eliminate any risk of loss of water service to the YTID. Alternative 5 is also compatible with the short-term or long-term implementation of NFCCR.

The main disadvantage of Alternative 5 is its high annual O&M cost. The high O&M cost is primarily the result of power costs to pump water to FCR. YTID would need federal, state, or local funding assistance from Basin stakeholders in the form of capped power rates, construction grants, and/or no-interest loans to make this project financially feasible for the District. Table 8-2 summarizes the cost and non-cost attributes of Alternative 5.

Table 8-2. Cost and Noncost Attributes of Alternative 5

Alternative 5 – Construct Wapatox Pump Station and Pipeline			
Estimate of Total Project Capital Cost	2025 Combined Annual O&M and Power Cost	Advantages	Disadvantages
\$193,000,000 (2022) plus \$57,000,000 (2052) for rehabilitation/replacement costs	\$5,370,000	<ul style="list-style-type: none"> Environmental benefits (increases flow in Tieton River) and minimal environmental impacts Maximizes available water supply and operational flexibility by accessing water from both the Tieton and Naches Rivers Consolidates diversions (eliminates YTID diversion and uses existing Wapatox diversion) Avoids winter construction work and potential impacts to YTID water operations Compatible with current or future construction of NFCCR In conjunction with the existing canal, provides a fully redundant water supply 	<ul style="list-style-type: none"> Requires participation from external stakeholders and funding partners High annual O&M cost

Another option available to YTID is the construction of Wapatox and NFCCR as described for Alternative 6A. Alternative 6A would provide significant added benefits to basin stakeholders in the form of additional water supplies, operational flexibility, and potential for water market reallocations. However, the cost and support required from external stakeholders are also significantly greater.

This alternative combines NFCCR with the new Wapatox system and could be implemented on a phased basis - by adding NFCCR when funding was available. This option would align with the elements of the Integrated Plan, as presented in Section 4. YTID could pursue either Alternative 6A or 6B, whereby 6A presents the best opportunity to find a funding partner (with additional storage and conveyance capacity) and 6B is primarily sized only for YTID needs but would cost significantly less. This alternative is probably easier to implement and with less opposition than 2B, but has a potential fatal flaw related to its significant annual O&M costs (mainly for pumping) unless YTID is able to find a project partner willing to cover annual costs to achieve this alternative's environmental benefits and its alignment with the Integrated Plan. Table 8-3 summarizes the cost and noncost attributes of Alternative 6A.

Table 8-3. Cost and Noncost Attributes of Alternative 6A

Alternative 6A – Construct Wapatox Pump Station and NFCCR			
Estimate of Total Project Capital Cost	2025 Combined Annual O&M and Power Cost	Advantages	Disadvantages
\$460,700,000 (2022) plus \$91,800,000 (2052) for rehabilitation/replacement costs	\$6,840,000	<ul style="list-style-type: none"> Increases available water supply to Yakima Basin stakeholders Environmental benefits (increases flow in Tieton River) Minimal environmental impacts Maximizes available water supply and operational flexibility by accessing water from both the Tieton and Naches Rivers Consolidates diversions (eliminates YTID diversion and uses existing Wapatox diversion) Avoids winter construction work and potential impacts to YTID water operations In conjunction with the existing canal, provides a fully redundant water supply 	<ul style="list-style-type: none"> Requires substantial participation from external stakeholders and funding partners High annual O&M cost

8.3 Recommendations and Next Steps

To assist YTID in choosing one of these options and beginning the implementation of the selected project, CH2M recommends several actions, summarized herein.

8.3.1 Initiate NEPA/SEPA Compliance

The NEPA/SEPA process fulfills federal and state laws by providing environmental review and generating information for federal and state regulators to consider when issuing permits. For most of the options YTID is considering, the overall process will take several years and will culminate in an Environmental Assessment (EA) or EIS, plus permits issued for construction. Currently, enough information is available to start this process and take the following steps:

- Provide a purpose and need statement upon which to base the project description and the alternatives to study.
- Develop a more detailed project description to facilitate discussions with agencies and stakeholders.
- Identify the lead state and federal agencies and meet with them to determine the appropriate level of NEPA analysis (EA or EIS).
- Identify the field investigations that should be conducted and what level of detail will be needed for the selected NEPA/SEPA document.

NEPA/SEPA documentation, and the process involved in preparing it, will help identify the best alternative, or help confirm the alternative YTID prefers complies with state and federal requirements. It will also detail mitigation requirements for potential cultural or environmental impacts and conditions, or stipulations for construction that need to be incorporated into design plans and specifications.

8.3.2 Coordinate with Integrated Plan Hydrologic Modeling Efforts

Reclamation is currently performing hydrologic modeling for the various Integrated Plan projects and they are planning to incorporate project(s) that YTID is considering. An important step for YTID will be to carefully characterize the alternatives being considered, and their potential interaction with other proposed Integrated Plan project operations, hydrology, and storage on the Tieton, Naches, and Yakima Rivers. For example, Reclamation's assumptions concerning improvements at Bumping Reservoir will have a significant impact on the available water supply for Wapatox and NFCCR. Reclamation's work will produce information that helps determine the available water supply for NFCCR, and is critical to both project feasibility and the EA or EIS.

8.3.3 Meet with District Landowners

A public meeting for YTID landowners should be held to update them on the alternatives being considered, the process YTID is following, and the timeline anticipated for NEPA/SEPA, design, funding, and construction.

8.3.4 Complete Tieton River Fish Study

One of the key differentiators among the alternatives being considered is the potential for the Wapatox concept to increase flows in the lower 15 miles of the Tieton River by moving YTID's diversion to the Naches River. However, the value this brings to the fishery in the Tieton River is currently unknown. CH2M recommends a study by qualified fish biologists to identify and understand the potential benefits. The outcome may help garner additional support for one of the Wapatox alternatives in the broader context of the Integrated Plan, and may help generate funding partners for construction or annual O&M costs, or both.

8.3.5 Investigate Power Supply for the Wapatox and NFCCR Projects

One element of the Wapatox and NFCCR alternatives that has not been addressed to date is the power supply to operate the large pump stations. Specifically, it needs to be determined generally where YTID would connect to existing facilities, the nature of the facilities to transmit that power to the pump station sites, and the cost of that power supply.

8.3.6 Geotechnical Investigations to Support Alternatives Selection

To date, layouts of each alternative and cost estimates have been developed without the benefit of any geotechnical field exploration. Specific elements of pipeline, RCB, tunnel, and dam construction can be much better understood for the sake of estimating costs and selecting alternatives if a few selected investigations are conducted, as follows:

- Excavate test pits at approximately 1000-foot intervals along the pipeline alignment in the Tieton River corridor to gain an understanding of the size of boulders and cobble, depth to bedrock, groundwater conditions, and sideslope stability for trenching.
- Perform pumping tests at three selected test pits to monitor drawdown and ability to dewater a pipeline trench adjacent to the river.
- Perform at least one deep initial boring at any proposed tunnel or bridge location to explore rock quality, potential interbeds that might exist, look for faults and shear zones that may be related to landslide instability; and monitor groundwater conditions in borings.
- Perform a deep boring at each of about three very large landslide locations - both upstream and downstream of Windy Point. Primarily looking for shear zones, interbeds, assess rock quality and strength, install piezometers for groundwater monitoring, consider inclinometers for indicators of potential lateral movement.
- Perform about three borings in the ridge separating proposed NFCCR from Tieton River to determine rock quality, potential interbeds that might exist, and monitor groundwater conditions in borings. Perform packer tests in each boring to determine estimated leakage that might occur in rock mass to better assess reservoir leakage and project feasibility.

These recommended initial geotechnical explorations will require permitting prior to initiating the field work. Additional explorations will likely be needed when a specific alternative is selected and advances to the design stage.

8.3.7 Complete Core Drilling for NFCCR

Because the NFCCR appears to still be a viable project as part of YTID's alternatives (funding dependent), an investigation should be considered to get a better understanding of subsurface conditions at the dam site. This will help confirm the type and configuration of the dam itself, as well as key elements such as the foundation, spillway, and borrow materials. The investigation will help clarify assumptions on important risk areas and will allow estimates of construction cost to be refined. Additional details of the recommended drilling work are provided in the study report for NFCCR.

8.3.8 Investigate Acquisition of Right-of-Way for NFCCR

YTID may wish to begin investigating the steps and cost of acquiring the land under the prospective NFCCR dam and inundation area. This may need to include an assessment of relocating access roads and fences.

8.3.9 Increase Outreach to Integrated Plan Workgroups and Stakeholders

The best alternatives for long-term mitigation of risk to YTID's water supply, factoring in both cost and non-cost considerations, will likely require significant outside funding. These alternatives are well-aligned with the Integrated Plan's seven goals and objectives, and the key workgroups and stakeholders should be briefed on a regular basis in an effort to secure increased support and potential funding. Active participation in the Water Use and Habitat Enhancement Workgroups is highly recommended.

References

CH2M HILL Engineers, Inc. (CH2M). 2016. *Draft North Fork Cowiche Creek Reservoir (NFCCR) Feasibility Study*. Prepared for the Yakima-Tieton Irrigation District.

CH2M HILL Engineers, Inc. (CH2M). 2017. *Feasibility Study - YTID Diversion Relocation to Wapatox Diversion Dam*. Prepared for the Yakima-Tieton Irrigation District.

Water Design-Build Council. 2016. *Water and Wastewater Design-Build Handbook*

Appendix A
Tieton Canal Replacement Project
Task Order 09 – Baseline Alternative
Technical Memorandum

Tieton Canal Replacement Project Task Order 09 - Baseline Alternative

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PREPARED BY: Ed Thomas/CH2M
DATE: September 1, 2017
PROJECT NUMBER: 470080.13.02.01

1.0 Background

Yakima-Tieton Irrigation District (District) has a maximum water right entitlement of 114,000 acre-feet from the Tieton River, of which 78,868 acre-feet is not prorated and 35,132 acre-feet is prorated. However, under the adjudication settlement agreement, the District is limited to annual withdrawals of 96,611 acre-feet between April 1- October 31 and 3,881 acre-feet between November 1- March 31. The District also can divert 908 acre-feet from the North Fork Cowlitz Creek between March 1- July 31 each year. The water diverted by the District is delivered throughout its 28,000-acre service area.

The District's 12-mile-long Tieton Canal is the backbone of their water supply system. The canal has served the District well for more than 100 years, but is currently operating beyond its normal life expectancy and has limited capacity. The annual maintenance costs are high. The risk of a catastrophic failure of the canal is increasing and the District is evaluating alternatives for repair or replacement of this key asset.

Since 2013, the District has been proactively planning to repair or replace the canal. CH2M is assisting the District by completing independent studies for replacement or augmentation projects.

This technical memorandum was developed without benefit of detailed site and condition assessments. If the District is considering implementing any of the baseline repair alternatives, it is recommended that condition assessments be performed when the canal is empty and available for access.

1.1 Purpose of Baseline Alternative Analysis

A Baseline Alternative, described in this technical memorandum, was identified in the event that District landowners or external stakeholders are unwilling or unable to endorse or participate in the implementation of a more robust, new facility. The Baseline Alternative is expected to be considerably less costly than other alternatives that replace the existing canal, but will not provide the same reliability, reduction of risk, longevity, capacity, or flexibility compared to other new facilities currently being considered.

The overall goal of the Baseline Alternative is to identify repairs and improvements and associated costs necessary to extend the useful life of the existing canal. This technical memorandum will focus on a review of existing maps and documents, identification of areas of elevated vulnerability, and recommendations on priorities of repairs and improvements. Recommendations will be based heavily on input from YTID, especially the YTID ditch tenders' visual observations, knowledge of Tieton Canal

history, and condition of the existing canal facilities. CH2M has not conducted a recent independent visual examination or condition assessment of the existing canal.

2.0 Baseline Alternative Workshop

On June 5, 2017, a workshop was held at the District office to discuss the Baseline Alternative in detail. Attendees from YTID included Rick Dieker, John Dickman, Matt Harris (Tieton Canal ditch tender), Steve Carter (previous Tieton Canal ditch tender), and David Dominguez. Attendees from CH2M included Dick Haapala and Ed Thomas. The remainder of this section will summarize discussions associated with the workshop agenda items.

2.1 Structural Deterioration

2.1.1 Headworks Facility

No significant issues were identified with the existing headworks facility that the District feels need upgrade or repair.

The headworks facility diversion dam was rehabilitated in the 1990's, and a fish ladder with bridge was constructed in 2005. The diversion can be remotely operated and includes a remote canal high water level alarm. In addition, the District feels that the headworks and associated facilities concrete are in fair condition. The three diversion gates and concrete structure have been in service since 1910.

The three original diversion gates leak slightly, and historically have contributed to ice problems in the canal during the off season. However, in 2012 an HDPE corrugated pipe with a radial gate were installed immediately downstream of the headworks for positive canal shutoff. The radial gate now allows any leaking water from the diversion gates to be directed back to the river via a bypass.

The headworks facility is typically operated with the three diversion gates fully open. The radial gate then automatically controls flow to the Tieton Canal. Historical Reclamation design documents indicate the capacity of the canal is 345 cfs. The canal is typically operated at 295 cfs. During normal operation the canal has also operated at 310-315 cfs for short durations. The high water alarm is set for 320 cfs (6.61 ft. of water depth as measured at the canal gauging station), although flow has reportedly reached 338 cfs for limited durations. The headworks is suitable for normal operations from April through early October. Extensive rehabilitation would be required to divert water in colder months or higher flow rates.

2.1.2 Canal Invert Erosion

Exposed reinforcing steel in the canal resulting from deterioration of the concrete is repaired at the end of each irrigation season. Only a 4-6 week window is available after the end of the irrigation season for the District to perform maintenance activities before the winter weather impedes access to the canal. The weather, difficult access (even during good weather), and minimal staff available to patch concrete requires that the District focus on patching only the worst locations where a large amount of reinforcing steel is visible.

The concrete that typically erodes and exposes reinforcing steel is located near the invert of the canal and up the side walls of the canal to a distance of approximately 18-inches above the invert. The erosion is due primarily to rocks that fall into the canal from steep hillsides above the canal. Fast-moving water in the canal tends to roll the rocks along the bottom of the canal for long distances, which wears and erodes the concrete. Concrete repair is sometimes needed higher on the side walls due to impacts from rocks rolling down the slope up gradient to the canal.

The precast concrete canal sections were constructed with a single mat of reinforcing steel in the concrete. Typically, the eroded concrete exposes the transversely installed top bar of the steel mat.

Regularly, the concrete has completely eroded under the reinforcing steel. More often, portions of the steel still embedded in the concrete form a rust line in the concrete that can be seen.

The reinforcing steel is critical to the structural integrity of the canal. Steel that is exposed to water, soil, or other elements is corroding and is seriously reducing the longevity of the canal. However, the District has not seen exposed reinforcing steel with any significant damage and therefore believes the structural integrity of the precast concrete sections remain intact as long as the eroded concrete is replaced.

The water diverted into the Tieton Canal is relatively cold and clean and does not include significant amounts of abrasive sediments that would contribute to erosion of the canal invert. Although the cold water with very low total dissolved solids can behave somewhat like a solvent eroding the cement out of the concrete, it does so very slowly and does not contribute to significant erosion. The erosion of the canal invert is primarily a result of rocks falling into the canal and being transported downstream by the force of the flowing water.

The canal design did not include rock traps (locations where the canal is widened and/or deepened to slow water velocity which allows the rocks to stop moving downstream). However, the canal includes three operational wasteways where the invert of the canal drops significantly for a short distance at the wasteway. The result is that each wasteway also acts as a rock trap. The District acknowledges that erosion of the canal invert is typically not as severe immediately downstream of the wasteways, indicating that rocks are the primary source of canal invert erosion.

Typically, patching of eroded concrete has been performed by hand with cement mortar along with a concrete adhesive to improve bonding to the existing concrete. In recent years, a ¼" aggregate has been added to the mortar along with pressure washing to clean the area in need of patching. The recent improvements to the patching method have worked well but still remain extremely labor intensive and the short window of maintenance always results in only the most severe locations being patched instead of all the locations that are in need of patching.

2.1.3 Pipe Bridges, Abutments, and Slide Bearings

The Tieton Canal includes several locations where the precast concrete canal transitions to a relatively short pipe that spans over a drainage. The pipe bridge allows stormwater runoff and debris to flow under the pipe. The pipe bridge typically has a concrete abutment at each end of the pipe, and a slide bearing on one end that allows the pipe to expand/contract in a controlled manner.

The District indicated that the pipe bridge facilities are in good shape and operating as intended. No improvements were identified to upgrade the pipe bridge facilities.

2.1.4 Corrugated Metal Pipe

There are several locations where the precast concrete canal transitions to a 102-inch diameter asphalt lined and coated corrugated steel pipe (CMP). The District indicated that overall the CMP is in relatively good condition other than the lining. The existing asphalt lining within the CMP is gone in many places. The CMP is corroding at a modest rate at locations where the lining is gone.

The District also identified two locations where a CMP section has relatively minor leaking resulting from a specific joint(s) that continually leak despite maintenance efforts. Typically plastic gutters and sheeting have been used to convey leaking water away from the canal and supports to minimize erosion and potential settlement. One of the locations is a CMP angle point at Bear Canyon.

Relining of the CMP and specific repairs to the CMP to stop leakage are necessary to extend its life.

2.1.5 Tunnels

The District did not indicate that any of the tunnels were in need of repair due to instability within the tunnel. The precast concrete canal configuration installed outside of the tunnels essentially transitions

to the same configuration within the tunnels. The invert erosion discussed previously in this Technical Memorandum for the canal is occurring within the tunnel invert also. Options for rehabilitation and repair for both the canal and tunnel invert are discussed later.

2.1.6 Steel Cross Braces

The existing precast concrete canal includes steel cross braces imbedded in the top of the concrete walls that span the canal. The cross braces are generally 3" x 5" uncoated steel channel or square steel bars and are typically installed on 6'-0" centers. Surface rust is visible on the steel but corrosion of the steel is minimal and is not known to be impacting structural integrity. The District indicated that some are bent from falling rocks or trees and some are missing, however they have not identified any problems with the cross braces and feel that most are still in sound condition.

2.2 Falling Rock and Debris

After the eruption of Mt. St. Helens in 1980, stormwater runoff increased and large amounts of rock and debris began entering the canal. It was determined that canal covers were necessary to minimize debris entering the canal. Two styles of canal covers were installed by a contractor at various locations over the canal where significant rock and debris flows were occurring. The District acquired surplus military aircraft landing mat material and installed it at additional locations where covers were needed. In addition, the District reported that some rocks that dislodged uphill from the canal have tumbled down the slope with enough force to smash a hole through the wall of the concrete canal. It can be anticipated that rainfall, freeze/thaw cycles, and earth tremors will continue to loosen rocks that tumble down the slope toward the canal. Although earthquakes are not frequent or severe in this area of Washington state, an earthquake of any significant magnitude could result in rockfall at multiple locations simultaneously.

2.2.1 Existing Canal Covers

Heavy canal covers were installed in 1981 that were constructed using 3/8" thick bridge decking with supports on either side of the canal so that no additional load was imparted on the existing precast concrete canal. The heavy canal covers were installed in areas where rockfalls were occurring and where the potential for rock slides or large rocks rolling down the hillside could damage the canal.

Light canal covers were installed in 1981 that were constructed using 12-gauge thick bridge decking but were supported by the existing precast concrete canal. The light canal covers were installed in locations where smaller rock and/or smaller debris was anticipated.

Some years after the initial installation of the covers, the District installed additional covers in various locations where they were still experiencing debris entering the canal. The covers that the district installed were used military surplus interlocking aircraft landing mats. The landing mats are constructed of steel with a thickness comparable to the previously installed "light" canal covers. The covers are supported by the steel cross bracing that spans the top of the precast concrete canal.

The three styles of canal covers have worked very well and continue to work well. The District indicated that no improvements are needed to the existing canal covers other than in some specific locations where erosion of the hillside on the down gradient side of the canal has or is undermining the heavy cover supports. The District fixes these erosion locations on an as needed basis throughout the irrigation season. See Attachment 1 for locations where the three styles of canal covers are installed.

2.2.2 Canal Overtopping Potential

The canal does not operate with a large amount of freeboard and therefore large rocks and debris that get into the canal could potentially cause the water in the canal to backup and overtop the canal. Overtopping has been reduced due to automated flow control and installation of canal covers that decreased debris of significant size from entering the canal and blocking water flow. However, the

District indicated that canal overtopping is still a concern and can happen without warning. Installation of additional canal covers will help reduce the possibility of debris entering the canal that can cause overtopping.

2.3 Cross-drainage Facilities

Pipe bridges have been installed at many locations along the canal where stormwater runoff crosses the canal. The pipe and CMP are supported on piers across the drainage, span the drainage completely, or a combination of pipe bridge and large diameter CMP.

There are also several locations where small drainages cross the canal, and stormwater is conveyed under the canal with small diameter pipes or small box culverts. In some instances, stormwater from small drainages is conveyed across the top of the canal in a culvert or across a canal cover.

The District feels confident in the existing condition of these stormwater facilities. None of these facilities are undersized or require extensive maintenance. The District performs regular maintenance throughout the irrigation season on an as-needed basis to make sure that the facilities do not become plugged or overgrown such that the runoff could be impeded. No improvements to these facilities are anticipated.

2.4 Slope Stability

The excellent condition of the existing precast concrete canal is a testament to the stability of the canal foundation. Although occasionally sidewall cracking or joints between the precast concrete sections need patching, overall the concrete canal is in relatively good condition considering its age. The canal does not appear to be settling or moving laterally based on the lack of significant crack development. Concrete repairs performed by the District are generally associated with the canal invert and sidewalls to a height of approximately 18-inches above the canal invert and are due to rocks moving through the canal.

The District has identified some locations where settlement of the canal was suspected. Field observation of at least one of these locations by a CH2M geotechnical engineer concluded that erosion of the downgradient side of the canal is more likely than settlement. If settlement were occurring, a significant increase in canal cracking or at a minimum concrete joint separation would be happening.

The primary cause of slope stability appears to be localized sloughing or stormwater erosion on steep slopes downhill of the canal. In at least one location, the O&M access trail has been completely lost and would take significant effort to rebuild. Although the canal foundation at this time does not appear to be impacted, it can be expected that the continued loss of downhill material will continue to work uphill toward the canal foundation and undermine the canal.

The District has performed continuous maintenance to stabilize these eroding slopes but the steep slopes inhibit building up the lost material by conventional means especially with such poor access to the majority of these locations. A comprehensive design and repair is required at each location where erosion continues.

2.5 Wasteway Functionality

The canal was designed with five operational wasteways. Wasteways 2 and 4 are not used anymore and have essentially been demolished. Concrete has been used to fill the canal/wasteway transition to the invert of the canal. The remaining three manually operated wasteways are used on an as-needed basis and function well according to the District. As mentioned previously, rocks tend to get trapped in the deeper section of the canal/wasteway transition. The rocks are flushed out of the transition when the wasteway is operated and do not impact operation of the wasteway gate. The District does not feel that additional wasteways are needed and does not anticipate the need for significant upgrades to the existing wasteways.

3.0 Repairs and Improvements

3.1 Canal Failure Vulnerability

Canal vulnerabilities have been identified through discussions with District personnel including the current and past ditch tenders who walk the canal every day during the irrigation season, as well as site visits by CH2M engineers.

The remainder of this section will discuss the canal vulnerabilities, recommendations for prioritization of repairs or upgrades, and alternatives for implementing the repairs or upgrades.

3.2 Repair or Upgrade Prioritization

Despite difficult access to the canal and limited maintenance durations during the non-irrigation season, the District has done a good job of prioritizing maintenance activities to make sure the canal does not fall into disrepair. Discussions with the District and CH2M did not identify infrastructure in immediate need of repair or upgrade.

Despite the good condition of the canal relative to its age, canal vulnerabilities were identified as part of the baseline alternative analysis. The vulnerabilities are listed in order of priority as follows:

- Erosion of steep slopes on downhill side of canal.
- High velocity rock impacts to external and internal concrete side walls from rock dislodged from hillside above the canal.
- Invert and partial internal sidewall concrete erosion due to rocks entering and moving downstream in canal.
- Lining CMP

The remainder of this section will discuss alternative concepts that could be implemented to reduce the probability of canal failure and damage.

3.2.1 Downhill Slope Erosion

Steep slopes and stormwater runoff are contributing to continuous slope erosion on the downhill side of the canal. Attachment 1 identifies locations where erosion continues despite maintenance efforts to shore up the slope. These locations must be permanently repaired. If these locations are not repaired, erosion could continue up the hill and undermine the canal foundation.

The existing materials at the various slope erosion locations vary as well as the slope steepness and accessibility by equipment. It is likely that repair and improvements to the steep slopes will need to be performed by hand with minimal if any heavy equipment.

CH2M recommends constructing gabion walls using gabion baskets to repair the specific slope erosion locations. Rock material would be identified as close to the site as possible to use for filling the gabion baskets. Attachment 2 identifies the general configuration of a gabion wall installation used for shoring the eroding steep slopes adjacent to the canal. Construction of a gabion wall adjacent to the canal will require a significant amount of manual labor to prepare a foundation for the wall, and then manual placement of rocks within gabion baskets as the wall increases in elevation. A typical three compartment gabion basket would have dimensions of approximately 3 ft. x 3 ft. x 9 ft.

Although specific drainage problems in the areas of the steep slopes have not been identified, a drainage evaluation would be performed on a case by case basis for each eroding slope. The evaluation would determine if the addition of culvert or drainage improvements would offer long term benefits to gabion wall stabilization.

3.2.2 Rock Impacts and Concrete Erosion

Consideration was given to simply allowing the rocks to fall into the canal and install rock traps at intervals along the length of the canal. The District's preference is to keep the rocks out of the canal entirely. New rock traps would require additional hand or mechanical maintenance to empty on a regular basis, because new wasteways to flush the rock traps are not an option. Allowing the rocks into the canal does not solve the canal concrete erosion problem due to rocks moving down the canal. In addition, high velocity impacts to the concrete canal would still remain a possibility.

To keep rock and debris out of the canal, several options were identified as part of the Baseline Alternative analysis. Physical barriers such as gabion walls or heavy fence fabric located on the uphill side of the canal to stop the rock were considered. Barriers of this style offer protection from rock and debris but the District felt that they were somewhat unproven in comparison to the existing canal covers that have worked so well over the years. In addition, many of the places where protection from rocks are needed occur at drainages where the District expressed concern for plugging of the fabric or mesh. Additional maintenance to clear rocks and debris from the barriers would be needed.

Rock impacts and concrete erosion can be mitigated by installing canal covers over the canal at locations identified by the District that are most susceptible to rockfall. The existing three styles of canal covers have worked very well over the last 36 years, and therefore the same or similar designs are recommended. The District has identified the locations and type of cover (heavy, light, and extra light) preferred at each location. Note that the extra light canal cover used a material (military surplus steel landing mats) that is not available anymore. Roof decking similar in strength to the landing mats is proposed with a similar installation over the canal.

With the rock essentially eliminated from the inside of the canal, erosion within the canal and the associated exposure of reinforcing steel should decrease significantly. It is anticipated that maintenance activities associated with the annual patching of exposed reinforcing steel will decrease over the course of several years to the point where reinforcing ceases to be exposed on a regular basis.

3.2.3 Lining Corrugated Metal Pipe

Although the CMP has not been inspected, based on input from the District, it is assumed that all of the CMP should be relined. The existing CMP is galvanized steel with asphalt lining and coating. In some locations the asphalt lining has been lost. Relining the CMP with cement mortar is recommended for long term CMP rehabilitation. The lining effort would include removal of loose asphalt, surface preparation of the CMP interior as needed to weld a mat of wire mesh to the CMP wall, and hand placement of cement mortar to a depth of approximately 1-1/2". The cement mortar lining would likely be installed to a height just above the water surface within the CMP. The remaining crown of the CMP could be lined with coal tar if needed.

3.3 Maintenance Impacts

Maintenance associated with the Tieton Canal is difficult. Only a limited number of access points to the canal are available to vehicles. Most of the canal can only be reached by footpath during the irrigation season. Maintenance on the outside of the canal during the irrigation season takes place but is generally limited to work that doesn't require heavy equipment.

Access to the entire canal alignment becomes easier during the non-irrigation season since small motorized ATVs can drive within the canal itself. However, performing maintenance between the end of the irrigation season and before winter weather arrives is limited to 4-6 weeks. The short maintenance window is extremely limiting on the amount of maintenance that can be performed.

After irrigation deliveries are terminated in early October, one of the first maintenance activities performed by the District is pressure washing the inside upper sidewalls of the canal where algae has

accumulated. It is critical to remove the algae at the end of the irrigation season. Not removing the algae would contribute to reduced capacity of the canal during the next irrigation season. To clean the algae off the wall, the district diverts approximately 10 cfs into the canal. A "spray buggy" within the canal then pumps the water flowing through the canal through high pressure nozzles that dislodge the algae from the sidewall. The spray buggy moves slowly downstream until the algae along the entire canal has been removed. The algae removal process takes approximately 25 days.

Patching concrete where erosion exposed reinforcing steel is the next maintenance activity, although sometimes it can be done in parallel with algae removal depending on the location. Materials for performing the concrete patching are staged toward the end of the irrigation season at a limited number of vehicle staging areas. As soon as the canal is clear of water, small motorized ATVs are used to transport the staged materials to the locations where concrete patching is required. Concrete patching is performed by hand and is tedious, time consuming work with a small crew. The patching work continues until winter weather forces the work to stop. The result is that not all the eroded concrete and exposed reinforcing steel can be patched prior to the next irrigation season.

3.3.1 Reduced Maintenance after Upgrades

Installation of the proposed canal covers will have an immediate long term impact on reduced canal maintenance. It is expected that erosion of the canal invert due to rock damage will decrease significantly after installation of the canal covers. Within a few years after installation of the covers, it is expected that the District will be able to catch up on all concrete erosion repairs using existing repair methods over the entire length of the canal.

Various cementitious and lining products are available for sealing concrete canals. A thorough investigation of the many options was not performed as part of this Baseline Alternative analysis. Instead, a proven product that has been developed and used extensively for concrete lined canals in the Yakima Valley and Columbia Basin is recommended for sealing the cracks, joints, and patches in the canal, including concrete canal within the tunnels. AquaLastic is a very flexible two part urea coating that is sprayed on to concrete surfaces after a sandblast preparation. It is recommended that AquaLastic applications begin in conjunction with canal cover installations. Although AquaLastic is durable and resists abrasion, it is preferred that the AquaLastic be applied in areas where rock entry into the canal and upstream of the application point have been mitigated with canal covers.

Installation of the canal covers and sealing of the canal with AquaLastic will decrease canal failure vulnerability. Maintenance will also be reduced significantly or at a minimum free crews up to perform other canal maintenance activities that have typically not received adequate attention.

A new reinforced mortar lining material should also be considered as a more robust, longer-lasting alternative to AquaLastic. At the conclusion of each irrigation season, a predetermined segment of canal could be mortar lined. The new liner would be approximately 2-inches thick and extend across the canal invert. See Attachment 3 for a conceptual detail of the lining concept proposed. The existing canal would be saw cut longitudinally on each side of the canal 18-inches above the invert to a depth of 1-inch. The concrete between the saw cuts would be chipped out to a depth of approximately 1-inch and then sandblasted. If deteriorated concrete is found during the chipping process, it would be removed as needed to find sound concrete. After sandblasting of the surface, a fiber reinforced mortar with high bonding characteristics would be spray applied to the prepared concrete surface. The spray applied surface would then be troweled to achieve a smooth finish. Steel reinforcing within the mortar would not be needed due to the fiber within the mortar and the bonding characteristics of the mortar. Control joints would be required at regular intervals, but it is not anticipated that significant formwork would be required. Due to time limitations for fall maintenance, however, lining would be limited to approximately ½-mile per year. A small reduction in canal capacity can be expected with this installation as indicated in Attachment 3. Implementation of this type of canal repair would significantly increase

the longevity of the canal surface especially in combination with additional canal covers that eliminate rock from entering the canal. The tradeoff off the increased canal surface durability is a small decrease in canal capacity, therefore this method of repair is less desirable than other options. A detailed investigation of capacity loss would be necessary if it is determined that this type of repair needs additional consideration.

4.0 Cost Estimate

Table 4-1 identifies costs associated with the previously identified recommendations for improvements and upgrades to the existing Tieton Canal. These recommendations are based on the overall goal of minimizing canal vulnerability and extending the life of the existing canal. See Attachment 4 for detailed cost estimates for each proposed improvement.

Table 4-1. Proposed Improvements Cost Estimate Summary

Item	Description	Estimated Cost
1	Shore Eroding Steep Slopes (3,000 LF)	\$2.63M
2	Install Heavy Canal Covers (7,506 LF)	\$10.2M
	Install Light Canal Covers (4,834 LF)	\$1.17M
	Install Extra Light Canal Covers (4,959 LF)	\$0.257M
3	Line 102-in. Dia. Corrugated Metal Pipe (1,075 LF)	\$0.195M
4a	Canal Sealing with AquaLastic (58,773 LF)	\$4.60M
4b	Canal Invert Replacement with Mortar Lining (58,773 LF)	\$6.97M
Total with AquaLastic Canal Sealing		\$19.1M
Total with Mortar Lining Canal Invert Replacement		\$21.4M

The cost estimate was prepared in accordance with the guidelines of the Association for the Advancement of Cost Engineering (AACE) International. According to the definitions of AACE International, the estimate will be an “order-of-magnitude” (Class 5) estimate. AACE defines this level of estimate as being prepared using limited information and preliminary engineering no more than 2 percent complete. Examples of estimating methods would include cost/capacity curves and factors, scale- of operations factors, and parametric and modeling techniques. It is normally expected that an estimate of this type would be accurate to within +50 to +100 percent on high side and -20 to -50 percent on low side of actual costs.

The cost estimate was prepared to support project development and evaluation from information available at the time of the estimate. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. Therefore, the final project costs will vary from the estimate presented here. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully considered by the District prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding. Our estimate is based on material, equipment, and labor pricing as of July 2017.

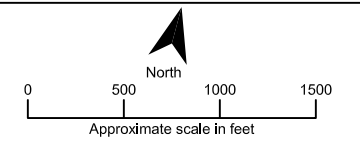
5.0 Pilot Projects

Discussions with the District indicated that a pilot project(s) associated with canal lining would be worthwhile. The District identified the following locations where application of AquaLastic could be performed. The locations identified below have both relatively easy access and more difficult access.

- Headworks Sandtrap Area
- Landing Areas
- Spill 3
- Immediately upstream of Wooden Bridge

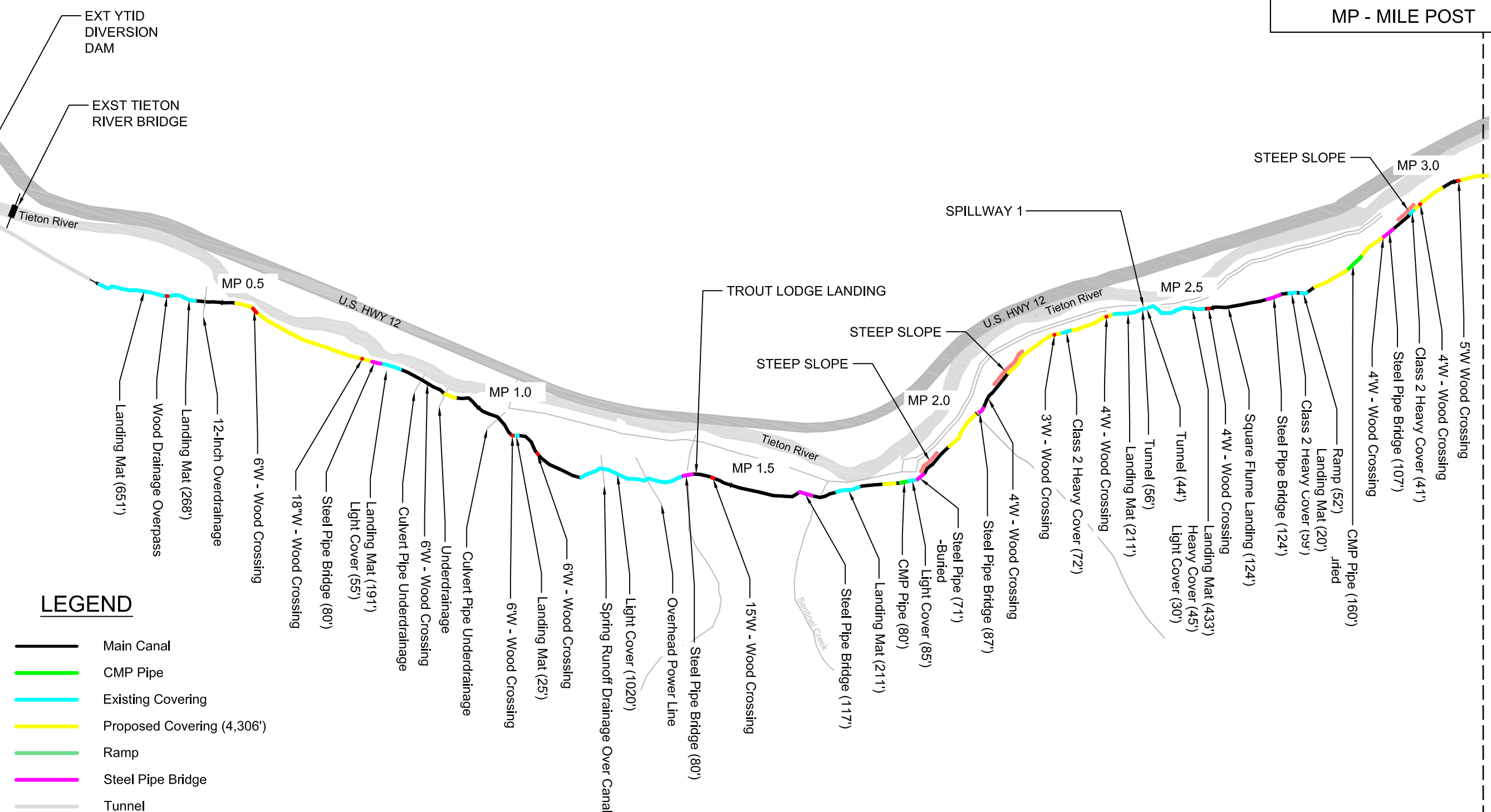
Performing small pilot projects at these locations will help the District better understand how well the lining can perform for their system and if additional lining would be worthwhile. In addition, the pilot projects will help quantify actual costs for application in their system relative to the varying difficulty of access and short maintenance window due to weather. Accurate cost estimating can then be performed for lining projects of bigger scale associated with long term canal rehabilitation.

Attachment 1
Tieton Canal Figures



MP - MILE POST

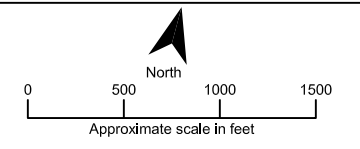
MATCHLINE - SEE FIGURE 2-2



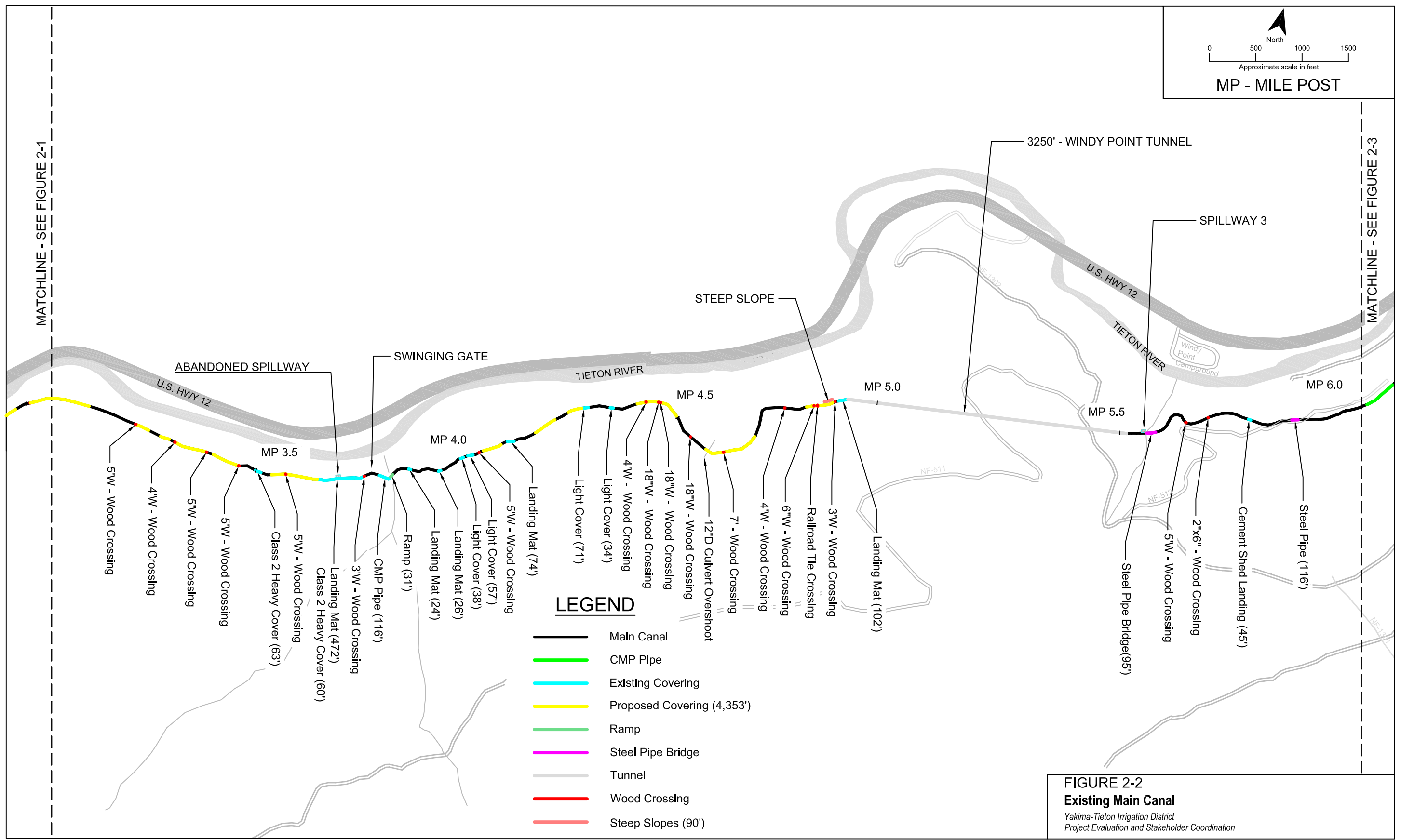
LEGEND

- Main Canal
- CMP Pipe
- Existing Covering
- Proposed Covering (4,306')
- Ramp
- Steel Pipe Bridge
- Tunnel
- Wood Crossing
- Steep Slope (840')

FIGURE 2-1
Existing Main Canal
 Yakima-Tieton Irrigation District
 Project Evaluation and Stakeholder Coordination



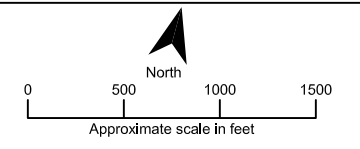
MP - MILE POST



LEGEND

- Main Canal
- CMP Pipe
- Existing Covering
- Proposed Covering (4,353')
- Ramp
- Steel Pipe Bridge
- Tunnel
- Wood Crossing
- Steep Slopes (90')

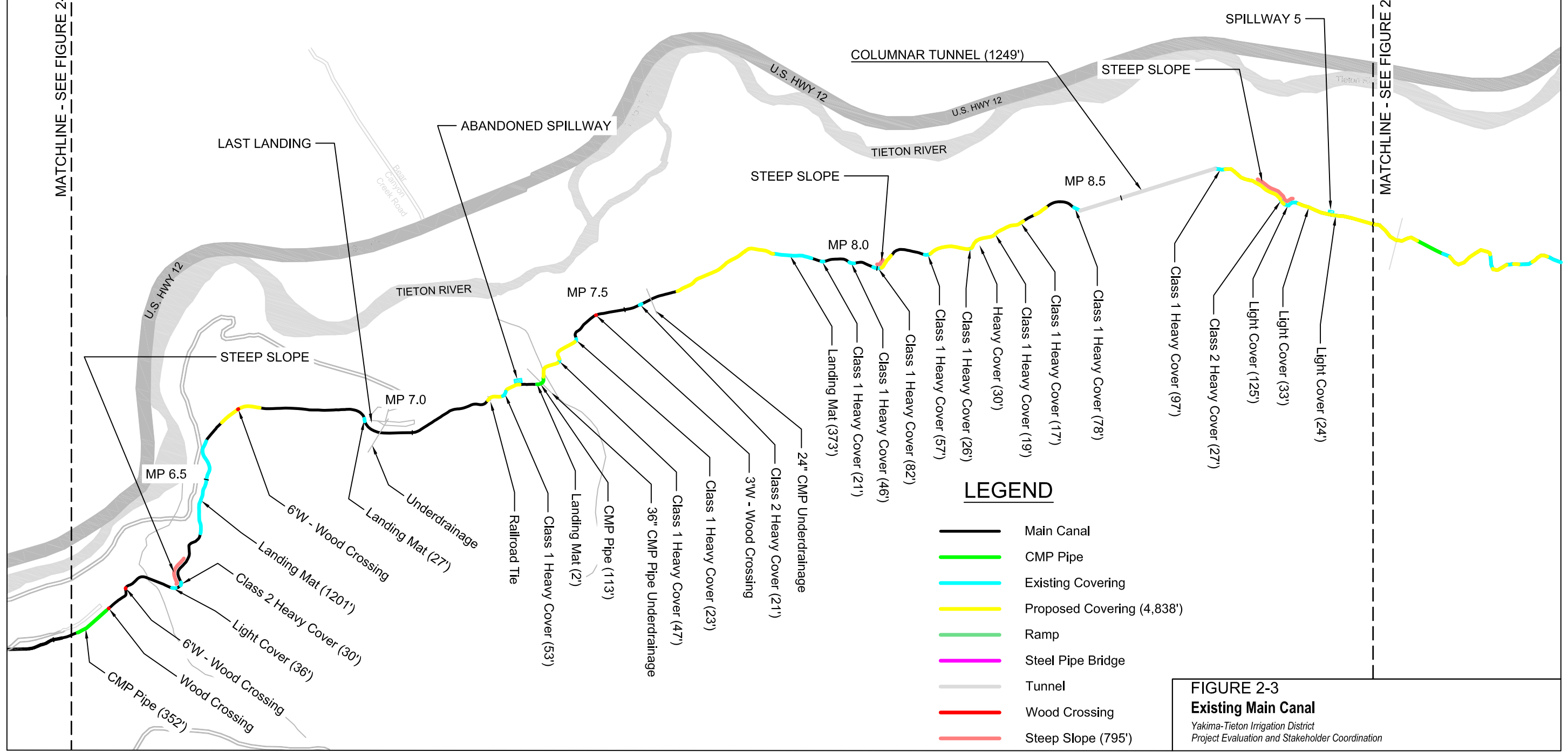
FIGURE 2-2
Existing Main Canal
 Yakima-Tieton Irrigation District
 Project Evaluation and Stakeholder Coordination



MP - MILE POST

MATCHLINE - SEE FIGURE 2-2

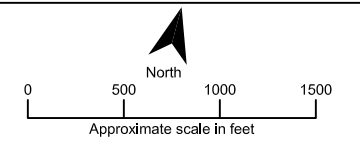
MATCHLINE - SEE FIGURE 2-4



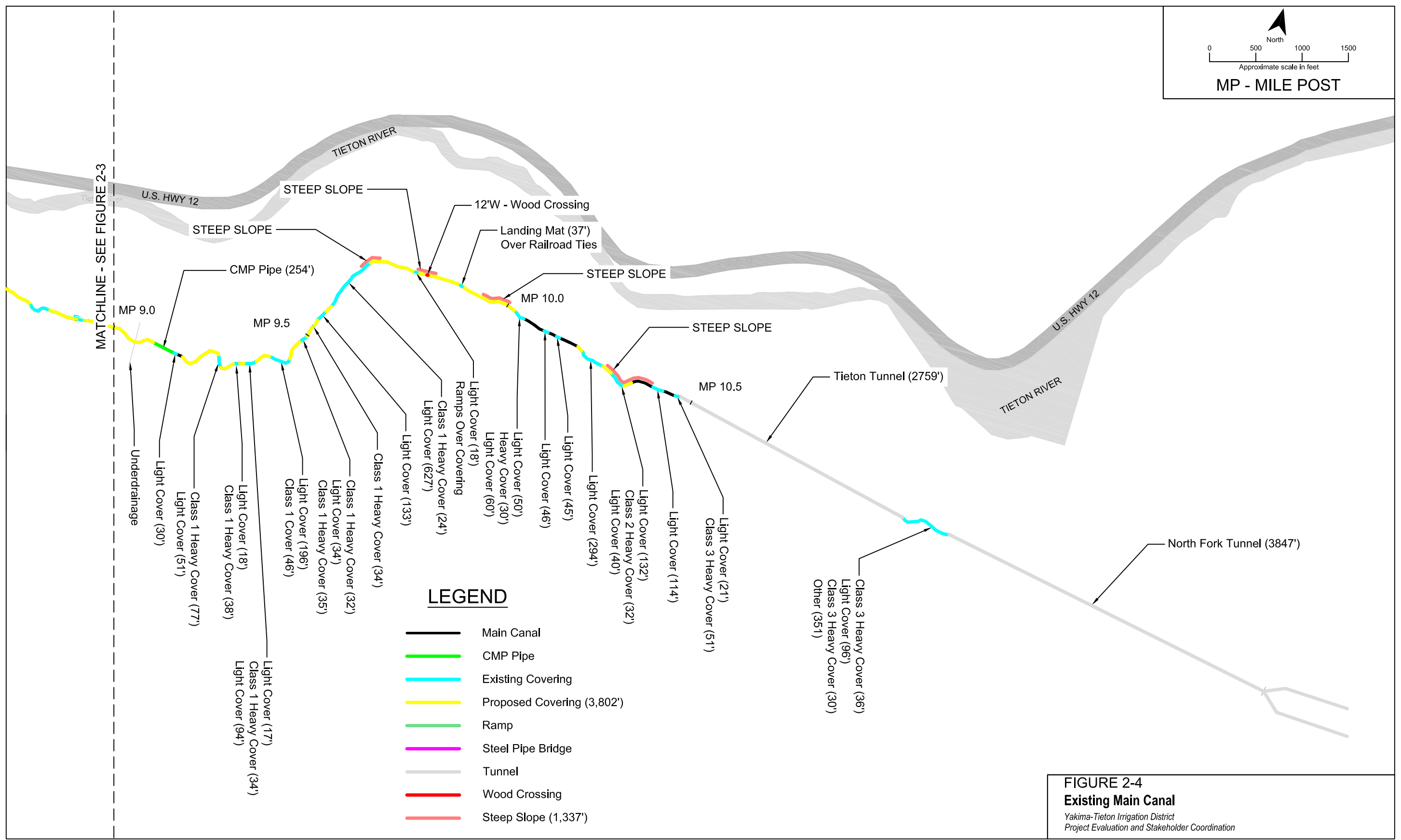
LEGEND

- Main Canal
- CMP Pipe
- Existing Covering
- Proposed Covering (4,838')
- Ramp
- Steel Pipe Bridge
- Tunnel
- Wood Crossing
- Steep Slope (795')

FIGURE 2-3
Existing Main Canal
 Yakima-Tieton Irrigation District
 Project Evaluation and Stakeholder Coordination



MP - MILE POST



MATCHLINE - SEE FIGURE 2-3

MP 9.0

MP 9.5

MP 10.0

MP 10.5

Underdrainage

Light Cover (30')

Class 1 Heavy Cover (77')

Light Cover (51')

Class 1 Heavy Cover (38')

Light Cover (18')

Class 1 Heavy Cover (35')

Light Cover (196')

Class 1 Heavy Cover (46')

Light Cover (34')

Class 1 Heavy Cover (32')

Light Cover (34')

Class 1 Heavy Cover (35')

Light Cover (17')

Class 1 Heavy Cover (34')

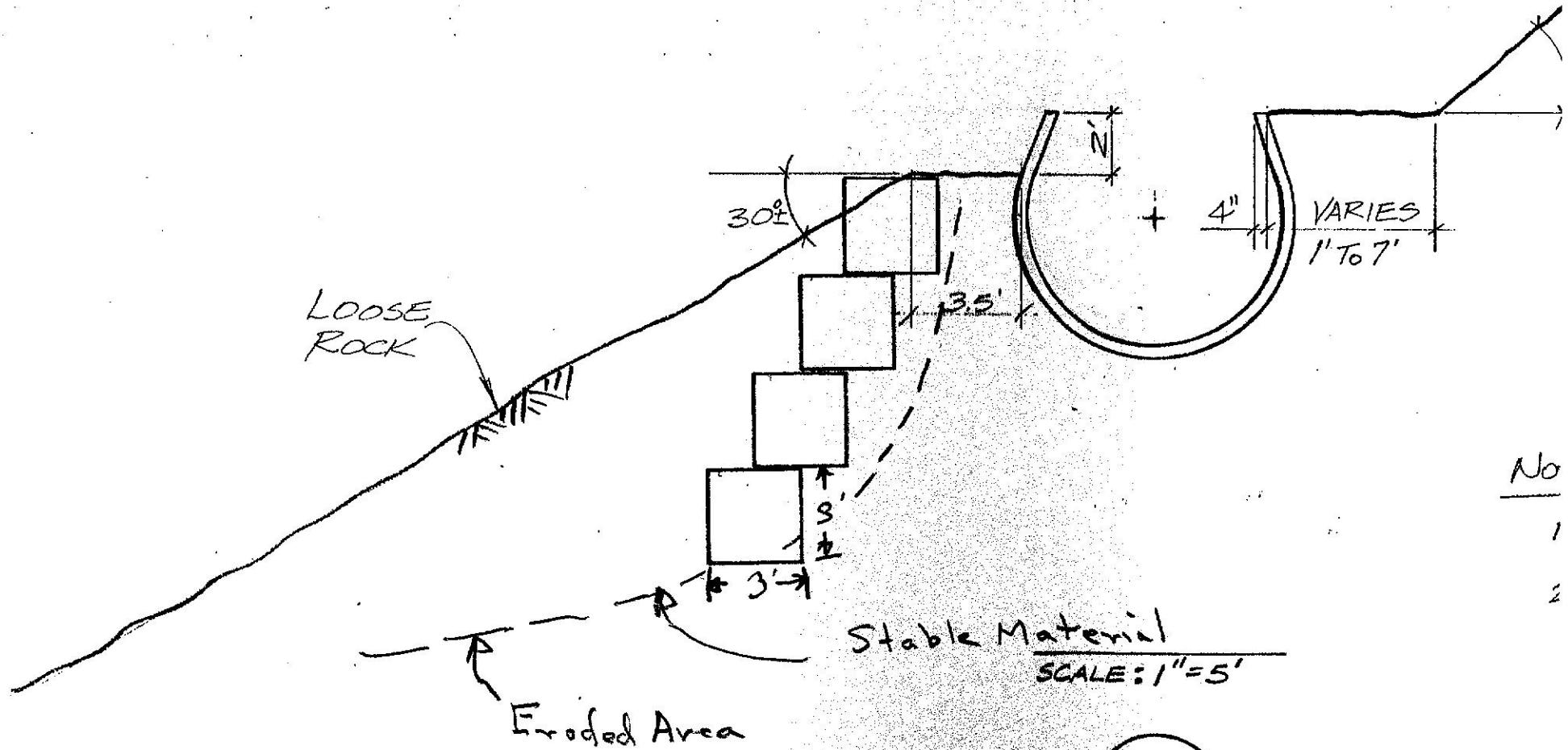
Light Cover (94')

LEGEND

- Main Canal
- CMP Pipe
- Existing Covering
- Proposed Covering (3,802')
- Ramp
- Steel Pipe Bridge
- Tunnel
- Wood Crossing
- Steep Slope (1,337')

FIGURE 2-4
Existing Main Canal
 Yakima-Tieton Irrigation District
 Project Evaluation and Stakeholder Coordination

Attachment 2
Steep Slope Erosion Repair Detail

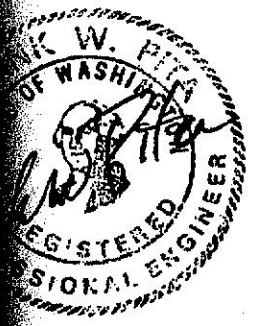


No
1
2

Stable Material
SCALE: 1"=5'

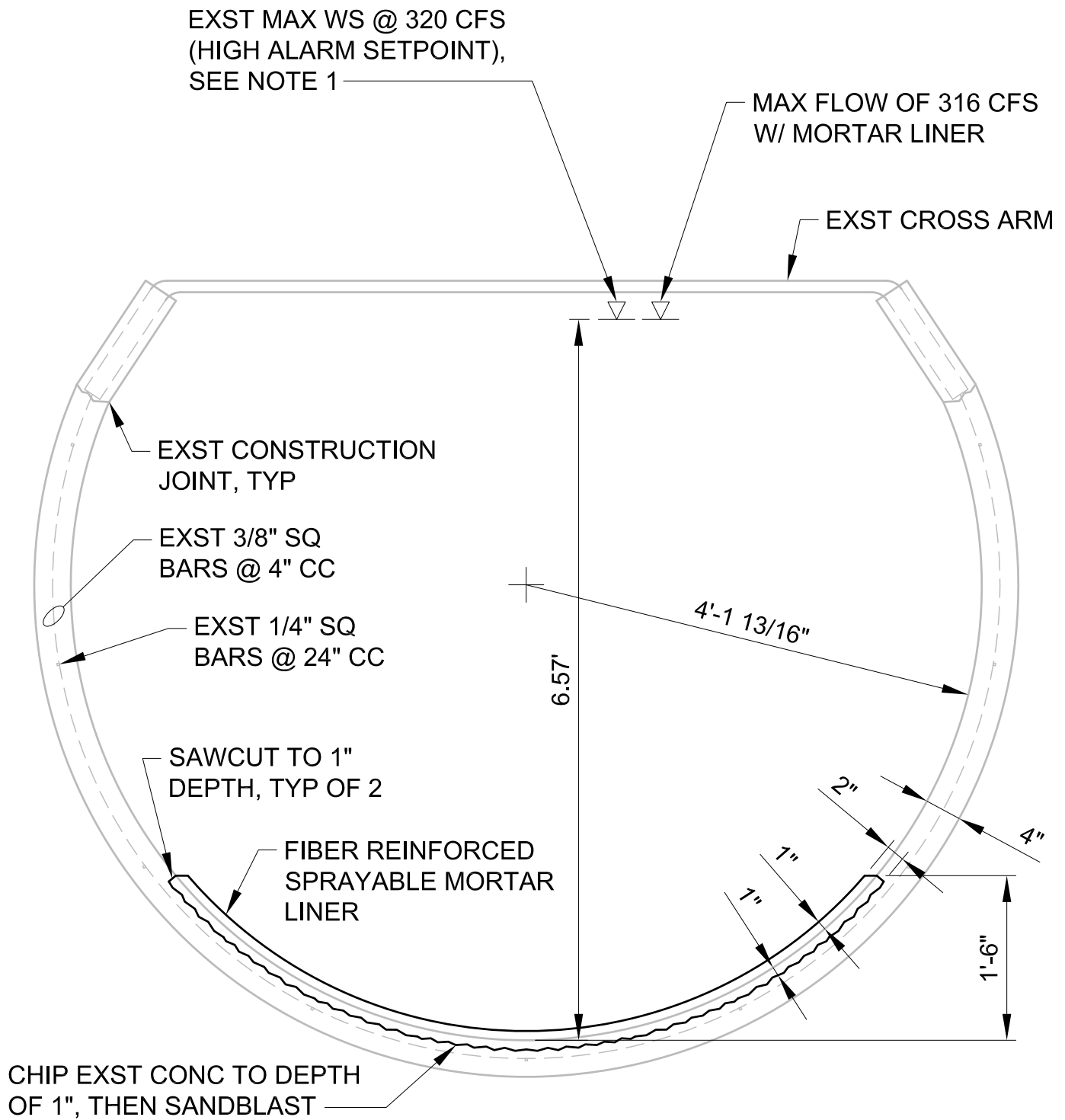
108

TOTAL LENGTH 36 LF.
STA 1+00 TO 1+36'



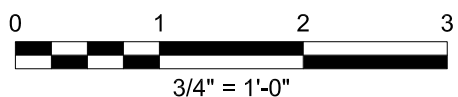
CH2M HILL	DES. CYS								LIGHT & HEAVY INSTALLA YAKIMA TETON IRRIG
	DR. CYS								
	CHK. FWP								
	APPD. FWP	NO.	DATE	REVISION	BY	APPD.			

Attachment 3
Mortar Lining Canal Repair Detail



NOTES:

1. HISTORICAL RECLAMATION DRAWINGS/REPORTS INDICATE A SLIGHTLY HIGHER MAXIMUM CANAL CAPACITY OF 345 CFS. IT IS RECOMMENDED THAT THE EXISTING HIGH WATER ALARM SETPOINT CONTINUE TO BE USED TO LIMIT CANAL FLOW.
2. THIS DETAIL DEVELOPED FROM RECLAMATION DOCUMENT YTP-3845, OCTOBER 12, 1922.



YAKIMA TIETON IRRIGATION DISTRICT
MORTAR CANAL LINING
CROSS SECTION

Attachment 4
Proposed Improvements Cost Estimates



Job Size:
Duration:

Summary Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 31, 2017
Estimate Class: 4

Fac	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
160	Steep Slope Erosion Repair	26.00 LF	371.48 /LF	132.02 /LF	/LF	/LF	/LF	503.51 /LF	13,091	875.27 /LF	22,757

Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	16,790			73.78%
Material	5,967			26.22%
Subcontract				
Equipment				
Other				
Total Construction Costs	22,757	22,757		100.00



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 31, 2017
Estimate Class: 4

Fac	Wor k Pkg	Trade Pkg	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
160			Steep Slope Erosion Repair										
	31.0		Earthwork										
		31.00	Site/Civil										
			Steep Slope Erosion Repair, Gabion Wall										
			Site Preparation, Other										
			Gabion boxes, galvanized steel mesh mats or boxes, stone filled, 36" deep	34.67 sy	77.82 /sy	74.00 /sy	-	0.00 /sy	-	151.82 /sy	5,263	263.91 /sy	9,150
			Hand Grade Base for Gabion Wall	78.00 sf	15.93 /sf	1.50 /sf	-	-	-	17.43 /sf	1,359	30.29 /sf	2,363
			Fill Face Slope, by Hand, On Site Borrow Material	26.00 lf	191.10 /lf	-	-	-	-	191.10 /lf	4,969	332.20 /lf	8,637
			Miscellaneous Items Allowance	1.00 ls	750.00 /ls	-	-	-	-	1,500.00 /ls	1,500	2,607.52 /ls	2,608
			Site Preparation, Other	1.00 LS	9,658.57 /LS	3,432.58 /LS	/LS	/LS	/LS	13,091.15 /LS	13,091	22,756.96 /LS	22,757
			Steep Slope Erosion Repair, Gabion Wall	26.00 LF	371.48 /LF	132.02 /LF	/LF	/LF	/LF	503.51 /LF	13,091	875.27 /LF	22,757
			31.00 Site/Civil	1.00 LS	9,658.57 /LS	3,432.58 /LS	/LS	/LS	/LS	13,091.15 /LS	13,091	22,756.96 /LS	22,757
			31.0 Earthwork	1.00 LS	9,658.57 /LS	3,432.58 /LS	/LS	/LS	/LS	13,091.15 /LS	13,091	22,756.96 /LS	22,757
			160 Steep Slope Erosion Repair	26.00 LF	371.48 /LF	132.02 /LF	/LF	/LF	/LF	503.51 /LF	13,091	875.27 /LF	22,757



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 31, 2017
Estimate Class: 4

Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	9,659			42.44%
Material	3,433			15.08%
Subcontract				
Equipment				
Other				
Subtotal Direct Costs	13,092	13,092		57.53
General Conditions	785		6.000 %	3.45%
Subtotal W/ General Conditions	785	13,877		3.45
Mobilization/Demobilization	555		4.000 %	2.44%
Prime Contractor Home OfficeOH	1,732		12.000 %	7.61%
Prime Contractor Profit	970		6.000 %	4.26%
Blder's Risk & Gen Liab Ins -%	171		1.000 %	0.75%
Payment & Performance Bonds	201		1.160 %	0.88%
Subtotal W/ Prime Markups	3,629	17,506		15.95
Contingency	5,252		30.000 %	23.08%
Subtotal W/ Contingency	5,252	22,758		23.08
Total Construction Costs		22,758		



Job Size:
Duration:

Summary Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Fac	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
100	Heavy Canal Cover	7,506.00 LF	202.68 /LF	548.34 /LF	/LF	33.99 /LF	/LF	785.01 /LF	5,892,274	1,364.62 /LF	10,242,821

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	2,644,510			25.82%
Material	7,154,777			69.85%
Subcontract				
Equipment	443,533			4.33%
Other				
Total Construction Costs	10,242,820	10,242,820		100.00



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Fac	Wor k Pkg	Trade Pkg	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
100			Heavy Canal Cover										
	01.0		General Requirements										
		01.01	Construction Operations										
			Material Staging, Remote Access										
			General Conditions, Other										
			Material Staging, Remote Access, Load, Deliver to Site, Unload, 4 Men, ATV and Trailer, 2 HR per Load, 1,000 lbs per Load	2,700.00 load	414.05 /load		-	70.00 /load	-	484.05 /load	1,306,930	841.44 /load	2,271,898
			General Conditions, Other	1.00 LS	1,117,929.60 /LS	/LS	/LS	189,000.00 /LS	/LS	1,306,929.60 /LS	1,306,930	2,271,898.02 /LS	2,271,898
			Material Staging, Remote Access	1.00 LS	1,117,929.60 /LS	/LS	/LS	189,000.00 /LS	/LS	1,306,929.60 /LS	1,306,930	2,271,898.02 /LS	2,271,898
			01.01 Construction Operations	1.00 LS	1,117,929.60 /LS	/LS	/LS	189,000.00 /LS	/LS	1,306,929.60 /LS	1,306,930	2,271,898.02 /LS	2,271,898
			01.0 General Requirements	1.00 LS	1,117,929.60 /LS	/LS	/LS	189,000.00 /LS	/LS	1,306,929.60 /LS	1,306,930	2,271,898.02 /LS	2,271,898
	05.0		Metals										
		05.00	Metals										
			Heavy Canal Cover										
			Metals, Other										
			9" x 3" Bridge Plank 3/8" Thickness	112,590.00 sf	0.93 /sf	32.13 /sf	-	0.06 /sf	-	33.11 /sf	3,728,036	57.56 /sf	6,480,623
			1/2" Bolt, Nut, and Washer	18,765.00 ea	2.61 /ea	2.50 /ea	-	0.00 /ea	-	5.11 /ea	95,827	8.88 /ea	166,580
			1/2" Lag Screw and Washer	3,753.00 ea	2.61 /ea	2.00 /ea	-	-	-	4.61 /ea	17,289	8.01 /ea	30,054
			Metals, Other	112,590.00 SF	1.45 /SF	32.61 /SF	/SF	0.06 /SF	/SF	34.12 /SF	3,841,151	59.31 /SF	6,677,256
			Heavy Canal Cover	7,506.00 LF	21.72 /LF	489.20 /LF	/LF	0.82 /LF	/LF	511.74 /LF	3,841,151	889.59 /LF	6,677,256
			05.00 Metals	1.00 LS	163,030.70 /LS	3,671,935.20 /LS	/LS	6,185.42 /LS	/LS	3,841,151.32 /LS	3,841,151	6,677,256.44 /LS	6,677,256
			05.0 Metals	1.00 LS	163,030.70 /LS	3,671,935.20 /LS	/LS	6,185.42 /LS	/LS	3,841,151.32 /LS	3,841,151	6,677,256.44 /LS	6,677,256
	31.0		Earthwork										
		31.00	Site/Civil										
			Heavy Canal Cover, Gabon Footing										
			Site Preparation, Other										
			Gabon boxes, galvanized steel mesh mats or boxes, stone filled, 36" deep	2,502.00 sy	52.46 /sy	74.00 /sy	-	19.67 /sy	-	146.12 /sy	365,599	254.01 /sy	635,537
			Site Preparation, Other	1.00 LS	131,249.45 /LS	185,148.00 /LS	/LS	49,201.10 /LS	/LS	365,598.55 /LS	365,599	635,537.39 /LS	635,537
			Heavy Canal Cover, Gabon Footing	1.00 LS	131,249.45 /LS	185,148.00 /LS	/LS	49,201.10 /LS	/LS	365,598.55 /LS	365,599	635,537.39 /LS	635,537
			Heavy Canal Cover, Timber Footing										
			Site Preparation, Other										
			Timber Footing, Treated Timbers, Costs Calculated by Board Ft	78,876.00 bft	0.78 /bft	2.25 /bft	-	0.10 /bft	-	3.12 /bft	246,433	5.43 /bft	428,387
			Timber Beam 4 x 10, Treated Timbers, Costs Calculated by Board Ft	25,020.00 bft	0.92 /bft	2.25 /bft	-	0.12 /bft	-	3.28 /bft	82,161	5.71 /bft	142,825
			Fasteners, Strapping, and Bracing Allowance	1.00 ls	25,000.00 /ls	25,000.00 /ls	-	-	-	50,000.00 /ls	50,000	86,917.38 /ls	86,917
			Site Preparation, Other	1.00 LS	109,068.48 /LS	258,766.00 /LS	/LS	10,759.97 /LS	/LS	378,594.45 /LS	378,594	658,128.77 /LS	658,129
			Heavy Canal Cover, Timber Footing	1.00 LS	109,068.48 /LS	258,766.00 /LS	/LS	10,759.97 /LS	/LS	378,594.45 /LS	378,594	658,128.77 /LS	658,129
			31.00 Site/Civil	1.00 LS	240,317.93 /LS	443,914.00 /LS	/LS	59,961.07 /LS	/LS	744,193.00 /LS	744,193	1,293,666.16 /LS	1,293,666
			31.0 Earthwork	1.00 LS	240,317.93 /LS	443,914.00 /LS	/LS	59,961.07 /LS	/LS	744,193.00 /LS	744,193	1,293,666.16 /LS	1,293,666
			100 Heavy Canal Cover	7,506.00 LF	202.68 /LF	548.34 /LF	/LF	33.99 /LF	/LF	785.01 /LF	5,892,274	1,364.62 /LF	10,242,821



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	1,521,278			14.85%
Material	4,115,849			40.18%
Subcontract				
Equipment	255,146			2.49%
Other				
Subtotal Direct Costs	5,892,273	5,892,273		57.53
General Conditions	353,536		6.000 %	3.45%
Subtotal W/ General Conditions	353,536	6,245,809		3.45
Mobilization/Demobilization	249,832		4.000 %	2.44%
Prime Contractor Home OfficeOH	779,477		12.000 %	7.61%
Prime Contractor Profit	436,507		6.000 %	4.26%
Blder's Risk & Gen Liab Ins -%	77,116		1.000 %	0.75%
Payment & Performance Bonds	90,349		1.160 %	0.88%
Subtotal W/ Prime Markups	1,633,281	7,879,090		15.95
Contingency	2,363,728		30.000 %	23.08%
Subtotal W/ Contingency	2,363,728	10,242,818		23.08
Total Construction Costs		10,242,818		



Job Size:
Duration:

Summary Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Fac	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
110	Light Canal Cover	4,834.00 LF	47.66 /LF	85.09 /LF	/LF	6.49 /LF	/LF	139.24 /LF	673,093	242.05 /LF	1,170,069

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	400,492			34.23%
Material	715,025			61.11%
Subcontract				
Equipment	54,552			4.66%
Other				
Total Construction Costs	1,170,069	1,170,069		100.00



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Fac	Wor k Pkg	Trade Pkg	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
110			Light Canal Cover										
	01.0		General Requirements										
		01.01	Construction Operations										
			Material Staging, Remote Access										
			General Conditions, Other										
			Material Staging, Remote Access, Load, Deliver to Site, Unload, 4 Men, ATV and Trailer, 2 HR per Load, 1,000 lbs per Load	285.00 load	414.05 /load	0.00 /load	-	70.00 /load	-	484.05 /load	137,954	841.44 /load	239,811
			General Conditions, Other	1.00 LS	118,003.68 /LS	/LS	/LS	19,950.00 /LS	/LS	137,953.68 /LS	137,954	239,811.47 /LS	239,811
			Material Staging, Remote Access	1.00 LS	118,003.68 /LS	/LS	/LS	19,950.00 /LS	/LS	137,953.68 /LS	137,954	239,811.47 /LS	239,811
			01.01 Construction Operations	1.00 LS	118,003.68 /LS	/LS	/LS	19,950.00 /LS	/LS	137,953.68 /LS	137,954	239,811.47 /LS	239,811
			01.0 General Requirements	1.00 LS	118,003.68 /LS	/LS	/LS	19,950.00 /LS	/LS	137,953.68 /LS	137,954	239,811.47 /LS	239,811
	05.0		Metals										
		05.00	Metals										
			Light Canal Cover										
			Metals, Other										
			6" x 2" Bridge Plank 12 Ga. Thickness	34,375.20 sf	0.93 /sf	8.37 /sf	-	0.06 /sf	-	9.35 /sf	321,459	16.26 /sf	558,807
			9" x 3" Bridge Plank 7 Ga. Thickness	4,296.80 sf	0.93 /sf	15.53 /sf	-	0.06 /sf	-	16.51 /sf	70,947	28.70 /sf	123,331
			L 3x3x1/4 10" Long	2,865.00 ea	11.73 /ea	10.35 /ea	-	2.78 /ea	-	24.86 /ea	71,235	43.22 /ea	123,832
			1" x 3/16" x 8' Long Bar	717.00 ea	7.82 /ea	8.00 /ea	-	1.86 /ea	-	17.68 /ea	12,674	30.73 /ea	22,031
			5/8" Bolt, Nut, and Washer	5,730.00 ea	2.61 /ea	1.50 /ea	-	-	-	4.11 /ea	23,531	7.14 /ea	40,905
			1/2" Bolt, Nut, and Washer	8,594.00 ea	2.61 /ea	1.50 /ea	-	-	-	4.11 /ea	35,293	7.14 /ea	61,351
			Metals, Other	38,672.00 SF	2.91 /SF	10.64 /SF	/SF	0.30 /SF	/SF	13.84 /SF	535,139	24.06 /SF	930,258
			Light Canal Cover	4,834.00 LF	23.25 /LF	85.09 /LF	/LF	2.37 /LF	/LF	110.70 /LF	535,139	192.44 /LF	930,258
			05.00 Metals	1.00 LS	112,383.01 /LS	411,324.47 /LS	/LS	11,431.46 /LS	/LS	535,138.94 /LS	535,139	930,257.52 /LS	930,258
			05.0 Metals	1.00 LS	112,383.01 /LS	411,324.47 /LS	/LS	11,431.46 /LS	/LS	535,138.94 /LS	535,139	930,257.52 /LS	930,258
			110 Light Canal Cover	4,834.00 LF	47.66 /LF	85.09 /LF	/LF	6.49 /LF	/LF	139.24 /LF	673,093	242.05 /LF	1,170,069



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	230,387			19.69%
Material	411,324			35.15%
Subcontract				
Equipment	31,381			2.68%
Other				
Subtotal Direct Costs	673,092	673,092		57.53
General Conditions	40,386		6.000 %	3.45%
Subtotal W/ General Conditions	40,386	713,478		3.45
Mobilization/Demobilization	28,539		4.000 %	2.44%
Prime Contractor Home OfficeOH	89,042		12.000 %	7.61%
Prime Contractor Profit	49,864		6.000 %	4.26%
Blder's Risk & Gen Liab Ins -%	8,809		1.000 %	0.75%
Payment & Performance Bonds	10,321		1.160 %	0.88%
Subtotal W/ Prime Markups	186,575	900,053		15.95
Contingency	270,016		30.000 %	23.08%
Subtotal W/ Contingency	270,016	1,170,069		23.08
Total Construction Costs		1,170,069		



Job Size:
Duration:

Summary Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Fac	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
120	Extra Light Canal Cover	4,959.00 LF	11.53 /LF	17.25 /LF	/LF	1.09 /LF	/LF	29.87 /LF	148,119	51.92 /LF	257,482

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	99,384			38.60%
Material	148,716			57.76%
Subcontract				
Equipment	9,383			3.64%
Other				
Total Construction Costs	257,483	257,483		100.00



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Fac	Wor k Pkg	Trade Pkg	Description	Takeoff Qty	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
120			Extra Light Canal Cover										
	01.0		General Requirements										
		01.01	Construction Operations										
			Material Staging, Remote Access										
			General Conditions, Other										
			Material Staging, Remote Access, Load, Deliver to Site, Unload, 4 Men, ATV and Trailer, 2 HR per Load, 1,000 lbs per Load	60.00 load	414.05 /load		-	70.00 /load	-	484.05 /load	29,043	841.44 /load	50,487
			General Conditions, Other	1.00 LS	24,842.88 /LS	/LS	/LS	4,200.00 /LS	/LS	29,042.88 /LS	29,043	50,486.62 /LS	50,487
			Material Staging, Remote Access	1.00 LS	24,842.88 /LS	/LS	/LS	4,200.00 /LS	/LS	29,042.88 /LS	29,043	50,486.62 /LS	50,487
			01.01 Construction Operations	1.00 LS	24,842.88 /LS	/LS	/LS	4,200.00 /LS	/LS	29,042.88 /LS	29,043	50,486.62 /LS	50,487
			01.0 General Requirements	1.00 LS	24,842.88 /LS	/LS	/LS	4,200.00 /LS	/LS	29,042.88 /LS	29,043	50,486.62 /LS	50,487
	05.0		Metals										
		05.00	Metals										
			Super Light Canal Cover										
			Metals, Other										
			Metal roof decking, steel, open type B wide rib, galvanized, over 500 Sq, 1-1/2" D, 20 gauge	34,713.00 sf	0.58 /sf	2.25 /sf	-	0.03 /sf	-	2.87 /sf	99,499	4.98 /sf	172,964
			U-Bolts to Existing Cross Arms	2,482.00 ea	4.89 /ea	3.00 /ea	-		-	7.89 /ea	19,577	13.71 /ea	34,031
			Metals, Other	34,713.00 SF	0.93 /SF	2.47 /SF	/SF	0.03 /SF	/SF	3.43 /SF	119,076	5.96 /SF	206,996
			Super Light Canal Cover	4,959.00 LF	6.52 /LF	17.25 /LF	/LF	0.24 /LF	/LF	24.01 /LF	119,076	41.74 /LF	206,996
			05.00 Metals	1.00 LS	32,328.37 /LS	85,550.25 /LS	/LS	1,197.53 /LS	/LS	119,076.15 /LS	119,076	206,995.76 /LS	206,996
			05.0 Metals	1.00 LS	32,328.37 /LS	85,550.25 /LS	/LS	1,197.53 /LS	/LS	119,076.15 /LS	119,076	206,995.76 /LS	206,996
			120 Extra Light Canal Cover	4,959.00 LF	11.53 /LF	17.25 /LF	/LF	1.09 /LF	/LF	29.87 /LF	148,119	51.92 /LF	257,482



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / July 20, 2017
Estimate Class: 4

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	57,171			22.20%
Material	85,550			33.23%
Subcontract				
Equipment	5,398			2.10%
Other				
Subtotal Direct Costs	148,119	148,119		57.53
General Conditions	8,887		6.000 %	3.45%
Subtotal W/ General Conditions	8,887	157,006		3.45
Mobilization/Demobilization	6,280		4.000 %	2.44%
Prime Contractor Home OfficeOH	19,594		12.000 %	7.61%
Prime Contractor Profit	10,973		6.000 %	4.26%
Blder's Risk & Gen Liab Ins -%	1,939		1.000 %	0.75%
Payment & Performance Bonds	2,271		1.160 %	0.88%
Subtotal W/ Prime Markups	41,057	198,063		15.95
Contingency	59,419		30.000 %	23.08%
Subtotal W/ Contingency	59,419	257,482		23.08
Total Construction Costs		257,482		



Job Size:
Duration:

Summary Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 1 / July 31, 2017
Estimate Class: 4

Fac	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
130	102-Inch Dia CMP Cement Mortar and Coal Tar Epoxy Lining	1,100.00 LF	48.23 /LF	29.87 /LF	/LF	24.04 /LF	/LF	102.14 /LF	112,353	177.55 /LF	195,309

Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	92,222			47.22%
Material	57,117			29.24%
Subcontract				
Equipment	45,970			23.54%
Other				
Total Construction Costs	195,309	195,309		100.00



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 1 / July 31, 2017
Estimate Class: 4

Fac	Wor k Pkg	Trade Pkg	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
130			102-Inch Dia CMP Cement Mortar and Coal Tar Epoxy Lining										
	01.0		General Requirements										
		01.01	Construction Operations										
			Material Staging, Remote Access										
			General Conditions, Other										
			Material Staging, Remote Access, Load, Deliver to Site, Unload, 1 Man, ATV and Trailer, 1 HR per Load	100.00 load	51.76 /load		-	35.00 /load	-	86.76 /load	8,676	150.81 /load	15,081
			General Conditions, Other	1.00 LS	5,175.60 /LS	/LS	/LS	3,500.00 /LS	/LS	8,675.60 /LS	8,676	15,081.22 /LS	15,081
			Material Staging, Remote Access	1.00 LS	5,175.60 /LS	/LS	/LS	3,500.00 /LS	/LS	8,675.60 /LS	8,676	15,081.22 /LS	15,081
			01.01 Construction Operations	1.00 LS	5,175.60 /LS	/LS	/LS	3,500.00 /LS	/LS	8,675.60 /LS	8,676	15,081.22 /LS	15,081
			01.0 General Requirements	1.00 LS	5,175.60 /LS	/LS	/LS	3,500.00 /LS	/LS	8,675.60 /LS	8,676	15,081.22 /LS	15,081
	33.0		Utilities										
		33.10	Piping, Specials										
			102-Inch Dia CMP Cement Mortar and Coal Tar Epoxy Lining										
			Pipe Specials, Other										
			Prep 102-Inch Dia CMP for Lining	29,662.00 sf	0.42 /sf		-	0.12 /sf	-	0.54 /sf	16,038	0.94 /sf	27,880
			PPE and Fresh Air Fan	45.00 day		15.00 /day	-	30.00 /day	-	45.00 /day	2,025	78.23 /day	3,520
			Welded wire fabric, sheets, 4 x 4 - W1.4 x W1.4 (10 x 10) 31 lb. per C.S.F., A185, incl labor for accessories, excl material for accessories	246.20 csf	36.46 /csf	21.50 /csf	-	15.00 /csf	-	72.96 /csf	17,963	126.83 /csf	31,226
			Lining 102-Inch Dia CMP, Cold Tar Epoxy, Brush On	5,042.00 sf	0.87 /sf	0.45 /sf	-	-	-	1.32 /sf	6,642	2.29 /sf	11,546
			Cement lining, waterproofed Portland cement, 1-1/2" thick, troweled on	24,620.00 sf	0.89 /sf	1.00 /sf	-	0.59 /sf	-	2.48 /sf	61,009	4.31 /sf	106,055
			Pipe Specials, Other	1.00 LS	47,875.70 /LS	32,857.20 /LS	/LS	22,944.80 /LS	/LS	103,677.70 /LS	103,678	180,227.88 /LS	180,228
			102-Inch Dia CMP Cement Mortar and Coal Tar Epoxy Lining	29,662.00 SF	1.61 /SF	1.11 /SF	/SF	0.77 /SF	/SF	3.50 /SF	103,678	6.08 /SF	180,228
			33.10 Piping, Specials	1.00 LS	47,875.70 /LS	32,857.20 /LS	/LS	22,944.80 /LS	/LS	103,677.70 /LS	103,678	180,227.88 /LS	180,228
			33.0 Utilities	1,100.00 LF	43.52 /LF	29.87 /LF	/LF	20.86 /LF	/LF	94.25 /LF	103,678	163.84 /LF	180,228
			130 102-Inch Dia CMP Cement Mortar and Coal Tar Epoxy Lining	1,100.00 LF	48.23 /LF	29.87 /LF	/LF	24.04 /LF	/LF	102.14 /LF	112,353	177.55 /LF	195,309



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 1 / July 31, 2017
Estimate Class: 4

Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	53,051			27.16%
Material	32,857			16.82%
Subcontract				
Equipment	26,445			13.54%
Other				
Subtotal Direct Costs	112,353	112,353		57.53
General Conditions	6,741		6.000 %	3.45%
Subtotal W/ General Conditions	6,741	119,094		3.45
Mobilization/Demobilization	4,764		4.000 %	2.44%
Prime Contractor Home OfficeOH	14,863		12.000 %	7.61%
Prime Contractor Profit	8,323		6.000 %	4.26%
Blder's Risk & Gen Liab Ins -%	1,470		1.000 %	0.75%
Payment & Performance Bonds	1,723		1.160 %	0.88%
Subtotal W/ Prime Markups	31,143	150,237		15.95
Contingency	45,071		30.000 %	23.08%
Subtotal W/ Contingency	45,071	195,308		23.08
Total Construction Costs		195,308		



Job Size:
Duration:

Summary Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 2 / July 31, 2017
Estimate Class: 4

Fac	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
140	Aqualastic Canal Lining	58,773.00 LF	/LF	/LF	44.90 /LF	/LF	/LF	44.90 /LF	2,638,908	78.05 /LF	4,587,339

Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor				
Material				
Subcontract	4,587,339			100.00%
Equipment				
Other				
Total Construction Costs	4,587,339	4,587,339		100.00



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 2 / July 31, 2017
Estimate Class: 4

Fac	Wor k Pkg	Trade Pkg	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
140			Aqualastic Canal Lining										
	33.0		Utilities										
		33.11	Canal, Specials										
			Aqualastic Canal Lining										
			Aqualastic Canal Lining										
			Aqualastic Canal Lining, Contractor Quote Info, Includes Remote Access and Surface Prep	1,175,460.00 sf			2.25 /sf		-	2.25 /sf	2,638,908	3.90 /sf	4,587,339
			Aqualastic Canal Lining	1,175,460.00 SF	/SF	/SF	2.25 /SF	/SF	/SF	2.25 /SF	2,638,908	3.90 /SF	4,587,339
			Aqualastic Canal Lining	1,175,460.00 SF	/SF	/SF	2.25 /SF	/SF	/SF	2.25 /SF	2,638,908	3.90 /SF	4,587,339
			33.11 Canal, Specials	1,175,460.00 SF	/SF	/SF	2.25 /SF	/SF	/SF	2.25 /SF	2,638,908	3.90 /SF	4,587,339
			33.0 Utilities	58,773.00 LF	/LF	/LF	44.90 /LF	/LF	/LF	44.90 /LF	2,638,908	78.05 /LF	4,587,339
			140 Aqualastic Canal Lining	58,773.00 LF	/LF	/LF	44.90 /LF	/LF	/LF	44.90 /LF	2,638,908	78.05 /LF	4,587,339



Job Size:
Duration:

Detail Report

Project: YTID Canal Covers
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 2 / July 31, 2017
Estimate Class: 4

Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor				
Material				
Subcontract	2,638,908			57.53%
Equipment				
Other				
Subtotal Direct Costs	2,638,908	2,638,908		57.53
General Conditions	158,334		6.000 %	3.45%
Subtotal W/ General Conditions	158,334	2,797,242		3.45
Mobilization/Demobilization	111,890		4.000 %	2.44%
Prime Contractor Home OfficeOH	349,096		12.000 %	7.61%
Prime Contractor Profit	195,494		6.000 %	4.26%
Blder's Risk & Gen Liab Ins -%	34,537		1.000 %	0.75%
Payment & Performance Bonds	40,464		1.160 %	0.88%
Subtotal W/ Prime Markups	731,481	3,528,723		15.95
Contingency	1,058,617		30.000 %	23.08%
Subtotal W/ Contingency	1,058,617	4,587,340		23.08
Total Construction Costs		4,587,340		



Job Size:
Duration:

Summary Report

Project: YTID Canal Mortar Repair
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / Sept. 1, 2017
Estimate Class: 4

Fac	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
100	Sprayable Motar Liner Repair										
	Existing Conditions	1.00 LS	1,365,258.52 /LS	232,038.32 /LS	/LS	275,525.97 /LS	/LS	1,872,822.81 /LS	1,872,823	3,255,617.16 /LS	3,255,617
	Concrete Work	2,590.00 CY	347.51 /CY	413.00 /CY	/CY	64.18 /CY	/CY	824.69 /CY	2,135,958	1,433.61 /CY	3,713,038
	100 Sprayable Motar Liner Repair	411,411.00 SF	5.51 /SF	3.16 /SF	/SF	1.07 /SF	/SF	9.74 /SF	4,008,781	16.94 /SF	6,968,655

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	3,937,901			56.51%
Material	2,262,819			32.47%
Subcontract				
Equipment	767,935			11.02%
Other				
Total Construction Costs	6,968,655	6,968,655		100.00



Job Size:
Duration:

Detail Report

Project: YTID Canal Mortar Repair
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / Sept. 1, 2017
Estimate Class: 4

Fac	Wor k Pkg	Trade Pkg	Description	Takeoff Quantity	Labor Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Equip Cost/Unit	Other Cost/Unit	Direct Cost/Unit	Direct Amount	Grand Total Unit Price	Grand Total w/Markups
100			Sprayable Motar Liner Repair										
	02.0		Existing Conditions										
		02.40	Demolition										
			Canal Concrete Surface Profiling										
			General Site Demolition										
			Sawcutting, concrete slabs, 1" deep	117,546.00 lf	0.10 /lf	0.10 /lf	-	0.04 /lf	-	0.24 /lf	28,213	0.42 /lf	49,044
			Profile Concrete Surface to 1" Depth	411,411.00 sf	1.55 /sf	-	-	0.35 /sf	-	1.90 /sf	782,783	3.31 /sf	1,360,750
			Additional Concrete Removal for Chasing Bad Concrete	411,411.00 sf	0.08 /sf	-	-	0.02 /sf	-	0.10 /sf	39,139	0.17 /sf	68,037
			Concrete finishing sandblast, light penetration	411,411.00 sf	1.22 /sf	0.52 /sf	-	0.16 /sf	-	1.90 /sf	781,397	3.30 /sf	1,368,340
			Removal of Demolished Material from Site	1,270.00 cy	103.51 /cy	-	-	23.33 /cy	-	126.85 /cy	161,094	220.50 /cy	280,037
			Load Demolished Material	1,270.00 cy	0.94 /cy	-	-	0.83 /cy	-	1.76 /cy	2,241	3.07 /cy	3,895
			Crew Staging, Remote Site	260.00 days	155.27 /days	-	-	35.00 /days	-	190.27 /days	49,470	330.75 /days	85,996
			Haul and Disposal of Demolished Material	1,270.00 cy	6.06 /cy	5.00 /cy	-	11.37 /cy	-	22.43 /cy	28,486	38.99 /cy	49,518
			General Site Demolition	1.00 LS	1,365,258.52 /LS	232,038.32 /LS	/LS	275,525.97 /LS	/LS	1,872,822.81 /LS	1,872,823	3,255,617.16 /LS	3,255,617
			Canal Concrete Surface Profiling	411,411.00 SF	3.32 /SF	0.56 /SF	/SF	0.67 /SF	/SF	4.55 /SF	1,872,823	7.91 /SF	3,255,617
			02.40 Demolition	1.00 LS	1,365,258.52 /LS	232,038.32 /LS	/LS	275,525.97 /LS	/LS	1,872,822.81 /LS	1,872,823	3,255,617.16 /LS	3,255,617
			02.0 Existing Conditions	1.00 LS	1,365,258.52 /LS	232,038.32 /LS	/LS	275,525.97 /LS	/LS	1,872,822.81 /LS	1,872,823	3,255,617.16 /LS	3,255,617
	03.0		Concrete Work										
		03.10	Cast-In-Place Concrete Work										
			Canal Shotcrete Lining										
			Concrete, Other										
			Shotcrete, wet mix, fiber reinforced, 3000 psi, 2" thick	411,411.00 sf	1.69 /sf	2.50 /sf	-	0.32 /sf	-	4.51 /sf	1,855,684	7.84 /sf	3,225,823
			Control Joints	411,411.00 sf	0.03 /sf	-	-	0.03 /sf	-	0.03 /sf	12,294	0.05 /sf	21,371
			Concrete surface treatment, curing, sprayed membrane compound	4,114.11 csf	4.31 /csf	10.00 /csf	-	-	-	14.31 /csf	58,885	24.88 /csf	102,363
			Staging Shotcrete Equipment, Remote Access	260.00 days	675.20 /days	-	-	129.01 /days	-	804.21 /days	209,096	1,398.00 /days	363,481
			Concrete, Other	2,590.00 CY	347.51 /CY	413.00 /CY	/CY	64.18 /CY	/CY	824.69 /CY	2,135,958	1,433.61 /CY	3,713,038
			Canal Shotcrete Lining	411,411.00 SF	2.19 /SF	2.60 /SF	/SF	0.40 /SF	/SF	5.19 /SF	2,135,958	9.03 /SF	3,713,038
			03.10 Cast-In-Place Concrete Work	2,590.00 CY	347.51 /CY	413.00 /CY	/CY	64.18 /CY	/CY	824.69 /CY	2,135,958	1,433.61 /CY	3,713,038
			03.0 Concrete Work	2,590.00 CY	347.51 /CY	413.00 /CY	/CY	64.18 /CY	/CY	824.69 /CY	2,135,958	1,433.61 /CY	3,713,038
			100 Sprayable Motar Liner Repair	411,411.00 SF	5.51 /SF	3.16 /SF	/SF	1.07 /SF	/SF	9.74 /SF	4,008,781	16.94 /SF	6,968,655



Job Size:
Duration:

Detail Report

Project: YTID Canal Mortar Repair
Project No.: 470080
Design Stage: Preliminary

Estimator: Nick Cavalleri/RDD
Revision / Date: 0 / Sept. 1, 2017
Estimate Class: 4

Estimate Totals

Construction Costs	Amount	Totals	Rate	% of Total
Labor	2,265,313			32.51%
Material	1,301,707			18.68%
Subcontract				
Equipment	441,761			6.34%
Other				
Subtotal Direct Costs	4,008,781	4,008,781		57.53
General Conditions	240,527		6.000 %	3.45%
Subtotal W/ General Conditions	240,527	4,249,308		3.45
Mobilization/Demobilization	169,972		4.000 %	2.44%
Prime Contractor Home OfficeOH	530,314		12.000 %	7.61%
Prime Contractor Profit	296,976		6.000 %	4.26%
Blder's Risk & Gen Liab Ins -%	52,466		1.000 %	0.75%
Payment & Performance Bonds	61,469		1.160 %	0.88%
Subtotal W/ Prime Markups	1,111,197	5,360,505		15.95
Contingency	1,608,151		30.000 %	23.08%
Subtotal W/ Contingency	1,608,151	6,968,656		23.08
Total Construction Costs		6,968,656		

Appendix B

Financial Modeling Calculations

Appendix B: Financial Analysis Support

Alternative 1 – 0 Percent Outside Cost Share

Alternative 1	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$837,471	\$828,624	\$1,046,599	\$1,262,646	\$1,478,946	\$1,695,391	\$1,911,894	\$2,128,365	\$2,344,711	\$2,560,838	\$2,776,647	\$2,992,037	\$3,206,907	\$3,421,149	\$3,634,655	
Annual Total Net Revenue	-\$8,847	\$217,976	\$216,047	\$216,300	\$216,445	\$216,503	\$216,471	\$216,346	\$216,127	\$215,809	\$215,391	\$214,869	\$214,242	\$213,506	\$212,659	
Ending Total Cash Reserve Balance	\$828,624	\$1,046,599	\$1,262,646	\$1,478,946	\$1,695,391	\$1,911,894	\$2,128,365	\$2,344,711	\$2,560,838	\$2,776,647	\$2,992,037	\$3,206,907	\$3,421,149	\$3,634,655	\$3,847,313	
Water Charge (\$/Share)	\$82	\$84	\$86	\$88	\$90	\$93	\$95	\$98	\$100	\$103	\$105	\$108	\$111	\$114	\$117	
Debt Charge (\$/Share)	\$198	\$198	\$198	\$198	\$198	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Charge to Cover New O&M (\$/Share)	\$0	\$0	\$0	\$0	\$0	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	
Total Charge (\$/Share)	\$279	\$281	\$283	\$286	\$288	\$95	\$98	\$100	\$103	\$106	\$108	\$111	\$114	\$117	\$120	
Pay-Go Construction Cost	\$6,200,000	\$6,200,000	\$6,200,000	\$6,200,000	\$6,200,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
New O&M						\$80,000	\$82,000	\$84,050	\$86,151	\$88,305	\$90,513	\$92,775	\$95,095	\$97,472	\$99,909	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,847,313	\$4,059,011	\$4,059,011	\$4,269,629	\$4,479,049	\$4,687,148	\$4,893,800	\$5,098,876	\$5,302,245	\$5,503,772	\$5,703,320	\$5,900,748	\$6,095,913	\$6,288,668	\$6,478,863	\$6,666,346
	\$211,697	\$210,619	\$210,619	\$209,420	\$208,099	\$206,652	\$205,076	\$203,369	\$201,527	\$199,548	\$197,428	\$195,165	\$192,755	\$190,195	\$187,483	\$184,615
	\$4,059,011	\$4,269,629	\$4,269,629	\$4,479,049	\$4,687,148	\$4,893,800	\$5,098,876	\$5,302,245	\$5,503,772	\$5,703,320	\$5,900,748	\$6,095,913	\$6,288,668	\$6,478,863	\$6,666,346	\$6,850,962
	\$120	\$122.95	\$123	\$126	\$129	\$133	\$136	\$140	\$143	\$147	\$151	\$155	\$159	\$163	\$167	\$172
	\$0	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$3	\$3.35	\$3	\$3	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$5	\$5
	\$123	\$126	\$126	\$130	\$133	\$136	\$140	\$144	\$147	\$151	\$155	\$159	\$163	\$167	\$172	\$176
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,160,000
	\$102,407	\$104,967	\$107,591	\$110,281	\$113,038	\$115,864	\$118,760	\$121,729	\$124,773	\$127,892	\$131,089	\$134,367	\$137,726	\$141,169	\$144,698	\$148,316

Alternative 1 – 25 Percent Outside Cost Share

Alternative 1	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
<i>Starting Total Cash Reserve Balance</i>	\$837,471	\$828,624	\$1,046,599	\$1,262,646	\$1,478,946	\$1,695,391	\$1,911,894	\$2,128,365	\$2,344,711	\$2,560,838	\$2,776,647	\$2,992,037	\$3,206,907	\$3,421,149	\$3,634,655
<i>Annual Total Net Revenue</i>	(\$8,847)	\$217,976	\$216,047	\$216,300	\$216,445	\$216,503	\$216,471	\$216,346	\$216,127	\$215,809	\$215,391	\$214,869	\$214,242	\$213,506	\$212,659
<i>Ending Total Cash Reserve Balance</i>	\$828,624	\$1,046,599	\$1,262,646	\$1,478,946	\$1,695,391	\$1,911,894	\$2,128,365	\$2,344,711	\$2,560,838	\$2,776,647	\$2,992,037	\$3,206,907	\$3,421,149	\$3,634,655	\$3,847,313
Water Charge (\$/Share)	\$82	\$84	\$86	\$88	\$90	\$93	\$95	\$98	\$100	\$103	\$105	\$108	\$111	\$114	\$117
Debt Charge (\$/Share)	\$149	\$149	\$149	\$149	\$149	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Charge to Cover New O&M (\$/Share)						\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
<i>Total Charge (\$/Share)</i>	\$230	\$232	\$234	\$237	\$239	\$95	\$97	\$100	\$102	\$105	\$108	\$110	\$113	\$116	\$119
Pay-Go Construction Cost	\$4,660,000	\$4,660,000	\$4,660,000	\$4,660,000	\$4,660,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
New O&M						\$60,000	\$61,500	\$63,038	\$64,613	\$66,229	\$67,884	\$69,582	\$71,321	\$73,104	\$74,932
2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
\$3,847,313	\$4,059,011	\$4,269,629	\$4,479,049	\$4,687,148	\$4,893,800	\$5,098,876	\$5,302,245	\$5,503,772	\$5,703,320	\$5,900,748	\$6,095,913	\$6,288,668	\$6,478,863	\$6,666,346	\$6,850,962
\$211,697	\$210,619	\$209,420	\$208,099	\$206,652	\$205,076	\$203,369	\$201,527	\$199,548	\$197,428	\$195,165	\$192,755	\$190,195	\$187,483	\$184,615	\$181,589
\$4,059,011	\$4,269,629	\$4,479,049	\$4,687,148	\$4,893,800	\$5,098,876	\$5,302,245	\$5,503,772	\$5,703,320	\$5,900,748	\$6,095,913	\$6,288,668	\$6,478,863	\$6,666,346	\$6,850,962	\$7,032,550
\$120	\$122.95	\$126	\$129	\$133	\$136	\$140	\$143	\$147	\$151	\$155	\$159	\$163	\$167	\$172	\$176
\$0	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$243
\$2	\$2.51	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$4
\$122	\$125	\$129	\$132	\$135	\$139	\$143	\$146	\$150	\$154	\$158	\$162	\$166	\$171	\$175	\$423
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,620,000
\$76,805	\$78,725	\$80,693	\$82,711	\$84,778	\$86,898	\$89,070	\$91,297	\$93,580	\$95,919	\$98,317	\$100,775	\$103,294	\$105,877	\$108,524	\$111,237

Alternative 1 – 50 Percent Outside Cost Share

Alternative 1	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$837,471	\$828,624	\$1,046,599	\$1,262,646	\$1,478,946	\$1,695,391	\$1,911,894	\$2,128,365	\$2,344,711	\$2,560,838	\$2,776,647	\$2,992,037	\$3,206,907	\$3,421,149	\$3,634,655	
Annual Total Net Revenue	(\$8,847)	\$217,976	\$216,047	\$216,300	\$216,445	\$216,503	\$216,471	\$216,346	\$216,127	\$215,809	\$215,391	\$214,869	\$214,242	\$213,506	\$212,659	
Ending Total Cash Reserve Balance	\$828,624	\$1,046,599	\$1,262,646	\$1,478,946	\$1,695,391	\$1,911,894	\$2,128,365	\$2,344,711	\$2,560,838	\$2,776,647	\$2,992,037	\$3,206,907	\$3,421,149	\$3,634,655	\$3,847,313	
Water Charge (\$/Share)	\$82	\$84	\$86	\$88	\$90	\$93	\$95	\$98	\$100	\$103	\$105	\$108	\$111	\$114	\$117	
Debt Charge (\$/Share)	\$99	\$99	\$99	\$99	\$99	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Charge to Cover New O&M (\$/Share)						\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$2	\$2	\$2	
Total Charge (\$/Share)	\$180	\$182	\$185	\$187	\$189	\$94	\$96	\$99	\$101	\$104	\$107	\$110	\$112	\$115	\$118	
Pay-Go Construction Cost	\$3,100,000	\$3,100,000	\$3,100,000	\$3,100,000	\$3,100,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
New O&M						\$40,000	\$41,000	\$42,025	\$43,076	\$44,153	\$45,256	\$46,388	\$47,547	\$48,736	\$49,955	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,847,313	\$4,059,011	\$4,269,629	\$4,479,049	\$4,687,148	\$4,893,800	\$5,098,876	\$5,302,245	\$5,503,772	\$5,703,320	\$5,900,748	\$6,095,913	\$6,288,668	\$6,478,863	\$6,666,346	\$6,850,962
	\$211,697	\$210,619	\$209,420	\$208,099	\$206,652	\$205,076	\$203,369	\$201,527	\$199,548	\$197,428	\$195,165	\$192,755	\$190,195	\$187,483	\$184,615	\$181,589
	\$4,059,011	\$4,269,629	\$4,479,049	\$4,687,148	\$4,893,800	\$5,098,876	\$5,302,245	\$5,503,772	\$5,703,320	\$5,900,748	\$6,095,913	\$6,288,668	\$6,478,863	\$6,666,346	\$6,850,962	\$7,032,550
	\$120	\$122.95	\$126	\$129	\$133	\$136	\$140	\$143	\$147	\$151	\$155	\$159	\$163	\$167	\$172	\$176
	\$0	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$162
	\$2	\$1.67	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
	\$121	\$125	\$128	\$131	\$135	\$138	\$142	\$145	\$149	\$153	\$157	\$161	\$165	\$170	\$174	\$340
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,080,000
	\$51,203	\$52,483	\$53,796	\$55,140	\$56,519	\$57,932	\$59,380	\$60,865	\$62,386	\$63,946	\$65,545	\$67,183	\$68,863	\$70,584	\$72,349	\$74,158

Alternative 2a – 0 Percent Outside Cost Share

Alternative 2a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	
Charge to Cover New O&M (\$/Share)						\$29	\$30	\$31	\$32	\$32	\$33	\$34	\$35	\$36	\$37	
<i>Total Charge (\$/Share)</i>	\$505	\$507	\$509	\$511	\$514	\$545	\$548	\$551	\$555	\$558	\$561	\$565	\$568	\$572	\$575	
Bond Payment	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	
New O&M						\$920,000	\$943,000	\$966,575	\$990,739	\$1,015,508	\$1,040,896	\$1,066,918	\$1,093,591	\$1,120,931	\$1,148,954	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$424	\$0
	\$38	\$38	\$39	\$40	\$41	\$42	\$44	\$45	\$46	\$47	\$48	\$49	\$50	\$52	\$53	\$54
	\$579	\$583	\$587	\$591	\$595	\$600	\$604	\$608	\$613	\$618	\$623	\$628	\$633	\$638	\$643	\$225
	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$13,298,031	\$0
	\$1,177,678	\$1,207,120	\$1,237,298	\$1,268,230	\$1,299,936	\$1,332,434	\$1,365,745	\$1,399,889	\$1,434,886	\$1,470,758	\$1,507,527	\$1,545,215	\$1,583,846	\$1,623,442	\$1,664,028	\$1,705,629

Alternative 2a – 25 Percent Outside Cost Share

Alternative 2a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	
Charge to Cover New O&M (\$/Share)						\$22	\$23	\$23	\$24	\$24	\$25	\$26	\$26	\$27	\$27	
Total Charge (\$/Share)	\$399	\$401	\$403	\$406	\$408	\$432	\$435	\$438	\$441	\$444	\$447	\$450	\$454	\$457	\$460	
Bond Payment	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	
New O&M						\$690,000	\$707,250	\$724,931	\$743,055	\$761,631	\$780,672	\$800,188	\$820,193	\$840,698	\$861,715	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$318	\$0
	\$28	\$29	\$30	\$30	\$31	\$32	\$33	\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40	\$41
	\$464	\$468	\$471	\$475	\$479	\$483	\$487	\$491	\$496	\$500	\$505	\$509	\$514	\$519	\$524	\$211
	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$9,976,560	\$0
	\$883,258	\$905,340	\$927,973	\$951,173	\$974,952	\$999,326	\$1,024,309	\$1,049,917	\$1,076,165	\$1,103,069	\$1,130,645	\$1,158,911	\$1,187,884	\$1,217,581	\$1,248,021	\$1,279,221

Alternative 2a – 50 Percent Outside Cost Share

Alternative 2a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	
Charge to Cover New O&M (\$/Share)						\$15	\$15	\$15	\$16	\$16	\$17	\$17	\$17	\$18	\$18	
<i>Total Charge (\$/Share)</i>	\$293	\$295	\$297	\$300	\$302	\$319	\$321	\$324	\$327	\$330	\$333	\$336	\$339	\$342	\$345	
Bond Payment	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	
New O&M						\$460,000	\$471,500	\$483,288	\$495,370	\$507,754	\$520,448	\$533,459	\$546,795	\$560,465	\$574,477	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$212	\$0
	\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$22	\$23	\$23	\$24	\$25	\$25	\$26	\$27	\$27
	\$348	\$352	\$355	\$359	\$363	\$366	\$370	\$374	\$378	\$382	\$387	\$391	\$396	\$400	\$405	\$198
	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$6,649,016	\$0
	\$588,839	\$603,560	\$618,649	\$634,115	\$649,968	\$666,217	\$682,873	\$699,944	\$717,443	\$735,379	\$753,764	\$772,608	\$791,923	\$811,721	\$832,014	\$852,814

Alternative 2b – 0 Percent Outside Cost Share

Alternative 2b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	
Charge to Cover New O&M (\$/Share)						\$17	\$17	\$17	\$18	\$18	\$19	\$19	\$20	\$20	\$21	
<i>Total Charge (\$/Share)</i>	\$319	\$321	\$323	\$325	\$327	\$346	\$349	\$351	\$354	\$357	\$360	\$363	\$366	\$370	\$373	
Bond Payment	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	
New O&M						\$520,000	\$533,000	\$546,325	\$559,983	\$573,983	\$588,332	\$603,041	\$618,117	\$633,570	\$649,409	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$237	\$306
	\$21	\$22	\$22	\$23	\$23	\$24	\$25	\$25	\$26	\$26	\$27	\$28	\$29	\$29	\$30	\$31
	\$376	\$380	\$383	\$387	\$391	\$395	\$398	\$402	\$407	\$411	\$415	\$420	\$424	\$429	\$434	\$507
	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$7,444,469	\$9,594,013
	\$665,644	\$682,285	\$699,342	\$716,826	\$734,746	\$753,115	\$771,943	\$791,241	\$811,023	\$831,298	\$852,081	\$873,383	\$895,217	\$917,598	\$940,537	\$964,051

Alternative 3 – 0 Percent Outside Cost Share

Alternative 3	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	
Charge to Cover New O&M (\$/Share)						\$17	\$17	\$17	\$18	\$18	\$19	\$19	\$20	\$20	\$21	
<i>Total Charge (\$/Share)</i>	\$621	\$623	\$625	\$628	\$630	\$649	\$651	\$654	\$657	\$660	\$663	\$666	\$669	\$672	\$676	
Bond Payment	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	
New O&M						\$520,000	\$533,000	\$546,325	\$559,983	\$573,983	\$588,332	\$603,041	\$618,117	\$633,570	\$649,409	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$540	\$540	\$540	\$540	\$540	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$107
	\$21	\$22	\$22	\$23	\$23	\$24	\$25	\$25	\$26	\$26	\$27	\$28	\$29	\$29	\$30	\$31
	\$679	\$682	\$686	\$690	\$693	\$698	\$702	\$706	\$710	\$714	\$719	\$723	\$728	\$732	\$737	\$309
	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$3,365,250
	\$665,644	\$682,285	\$699,342	\$716,826	\$734,746	\$753,115	\$771,943	\$791,241	\$811,023	\$831,298	\$852,081	\$873,383	\$895,217	\$917,598	\$940,537	\$964,051

Alternative 3 – 25 Percent Outside Cost Share

Alternative 3	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	
Charge to Cover New O&M (\$/Share)						\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15	\$15	\$16	
Total Charge (\$/Share)	\$486	\$488	\$491	\$493	\$495	\$510	\$512	\$515	\$518	\$520	\$523	\$526	\$529	\$532	\$536	
Bond Payment	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	
New O&M						\$390,000	\$399,750	\$409,744	\$419,987	\$430,487	\$441,249	\$452,280	\$463,587	\$475,177	\$487,057	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$405	\$405	\$405	\$405	\$405	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$80
	\$16	\$16	\$17	\$17	\$18	\$18	\$18	\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$22	\$23
	\$539	\$542	\$546	\$549	\$553	\$557	\$561	\$564	\$568	\$573	\$577	\$581	\$585	\$590	\$594	\$274
	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$2,522,419
	\$499,233	\$511,714	\$524,507	\$537,619	\$551,060	\$564,836	\$578,957	\$593,431	\$608,267	\$623,474	\$639,060	\$655,037	\$671,413	\$688,198	\$705,403	\$723,038

Alternative 3 – 50 Percent Outside Cost Share

Alternative 3	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	
Charge to Cover New O&M (\$/Share)						\$8	\$8	\$9	\$9	\$9	\$9	\$10	\$10	\$10	\$10	
Total Charge (\$/Share)	\$351	\$353	\$355	\$358	\$360	\$370	\$373	\$375	\$378	\$381	\$383	\$386	\$389	\$392	\$395	
Bond Payment	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	
New O&M						\$260,000	\$266,500	\$273,163	\$279,992	\$286,991	\$294,166	\$301,520	\$309,058	\$316,785	\$324,704	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$54
	\$11	\$11	\$11	\$11	\$12	\$12	\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15	\$15	\$15
	\$398	\$402	\$405	\$408	\$412	\$416	\$419	\$423	\$427	\$431	\$435	\$439	\$443	\$447	\$452	\$240
	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$1,685,661
	\$332,822	\$341,143	\$349,671	\$358,413	\$367,373	\$376,558	\$385,971	\$395,621	\$405,511	\$415,649	\$426,040	\$436,691	\$447,609	\$458,799	\$470,269	\$482,025

Alternative 3 – 75 Percent Outside Cost Share

Alternative 3	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	
Charge to Cover New O&M (\$/Share)						\$4	\$4	\$4	\$4	\$5	\$5	\$5	\$5	\$5	\$5	
Total Charge (\$/Share)	\$216	\$218	\$221	\$223	\$225	\$231	\$234	\$236	\$239	\$241	\$244	\$247	\$249	\$252	\$255	
Bond Payment	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	
New O&M						\$130,000	\$133,250	\$136,581	\$139,996	\$143,496	\$147,083	\$150,760	\$154,529	\$158,392	\$162,352	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$27
	\$5	\$5	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$7	\$7	\$7	\$7	\$7	\$7	\$8
	\$258	\$261	\$264	\$268	\$271	\$274	\$278	\$282	\$285	\$289	\$293	\$297	\$301	\$305	\$309	\$205
	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$842,830
	\$166,411	\$170,571	\$174,836	\$179,206	\$183,687	\$188,279	\$192,986	\$197,810	\$202,756	\$207,825	\$213,020	\$218,346	\$223,804	\$229,399	\$235,134	\$241,013

Alternative 4 – 0 Percent Outside Cost Share

Alternative 4	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	\$540	
Charge to Cover New O&M (\$/Share)						\$16	\$16	\$17	\$17	\$18	\$18	\$18	\$19	\$19	\$20	
New Power Charge (\$/Share)						\$31	\$31	\$32	\$32	\$32	\$32	\$33	\$33	\$33	\$34	
Total Charge (\$/Share)	\$621	\$623	\$625	\$628	\$630	\$679	\$682	\$685	\$688	\$691	\$695	\$698	\$701	\$705	\$709	
Bond Payment	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	
New O&M						\$500,000	\$512,500	\$525,313	\$538,445	\$551,906	\$565,704	\$579,847	\$594,343	\$609,201	\$624,431	
New Power Cost						\$970,000	\$979,700	\$989,497	\$999,392	\$1,009,386	\$1,019,480	\$1,029,675	\$1,039,971	\$1,050,371	\$1,060,875	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$540	\$540	\$540	\$540	\$540	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$541	\$107
	\$20	\$21	\$21	\$22	\$23	\$23	\$24	\$24	\$25	\$25	\$26	\$27	\$27	\$28	\$29	\$30
	\$34	\$34	\$35	\$35	\$36	\$36	\$36	\$37	\$37	\$37	\$38	\$38	\$38	\$39	\$39	\$40
	\$712	\$716	\$720	\$724	\$728	\$733	\$737	\$742	\$746	\$751	\$755	\$760	\$765	\$770	\$775	\$347
	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,941,328	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$16,960,817	\$3,365,250
	\$640,042	\$656,043	\$672,444	\$689,256	\$706,487	\$724,149	\$742,253	\$760,809	\$779,829	\$799,325	\$819,308	\$839,791	\$860,786	\$882,305	\$904,363	\$926,972
	\$1,071,483	\$1,082,198	\$1,093,020	\$1,103,950	\$1,114,990	\$1,126,140	\$1,137,401	\$1,148,775	\$1,160,263	\$1,171,866	\$1,183,584	\$1,195,420	\$1,207,374	\$1,219,448	\$1,231,643	\$1,243,959

Alternative 4 – 25 Percent Outside Cost Share

Alternative 4	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	
Charge to Cover New O&M (\$/Share)						\$12	\$12	\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15	
New Power Charge (\$/Share)						\$23	\$23	\$23	\$24	\$24	\$24	\$24	\$25	\$25	\$25	
Total Charge (\$/Share)	\$486	\$488	\$491	\$493	\$495	\$532	\$535	\$538	\$541	\$544	\$547	\$550	\$553	\$556	\$560	
Bond Payment	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	
New O&M						\$370,000	\$379,250	\$388,731	\$398,450	\$408,411	\$418,621	\$429,087	\$439,814	\$450,809	\$462,079	
New Power Cost						\$720,000	\$727,200	\$734,472	\$741,817	\$749,235	\$756,727	\$764,295	\$771,937	\$779,657	\$787,453	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$405	\$405	\$405	\$405	\$405	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$406	\$80
	\$15	\$15	\$16	\$16	\$17	\$17	\$18	\$18	\$18	\$19	\$19	\$20	\$20	\$21	\$21	\$22
	\$25	\$26	\$26	\$26	\$26	\$27	\$27	\$27	\$27	\$28	\$28	\$28	\$29	\$29	\$29	\$29
	\$563	\$567	\$571	\$574	\$578	\$583	\$587	\$591	\$595	\$599	\$604	\$608	\$613	\$618	\$622	\$302
	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,709,032	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$12,723,649	\$2,522,419
	\$473,631	\$485,472	\$497,609	\$510,049	\$522,800	\$535,870	\$549,267	\$562,999	\$577,074	\$591,501	\$606,288	\$621,445	\$636,981	\$652,906	\$669,229	\$685,959
	\$795,328	\$803,281	\$811,314	\$819,427	\$827,621	\$835,898	\$844,257	\$852,699	\$861,226	\$869,838	\$878,537	\$887,322	\$896,195	\$905,157	\$914,209	\$923,351

Alternative 4 – 50 Percent Outside Cost Share

Alternative 4	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	
Charge to Cover New O&M (\$/Share)						\$8	\$8	\$8	\$9	\$9	\$9	\$9	\$9	\$10	\$10	
New Power Charge (\$/Share)						\$15	\$15	\$16	\$16	\$16	\$16	\$16	\$16	\$17	\$17	
Total Charge (\$/Share)	\$351	\$353	\$355	\$358	\$360	\$385	\$388	\$391	\$393	\$396	\$399	\$402	\$405	\$408	\$412	
Bond Payment	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	
New O&M						\$250,000	\$256,250	\$262,656	\$269,223	\$275,953	\$282,852	\$289,923	\$297,171	\$304,601	\$312,216	
New Power Cost						\$480,000	\$484,800	\$489,648	\$494,544	\$499,490	\$504,485	\$509,530	\$514,625	\$519,771	\$524,969	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$270	\$54
	\$10	\$10	\$11	\$11	\$11	\$12	\$12	\$12	\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15
	\$17	\$17	\$17	\$17	\$18	\$18	\$18	\$18	\$18	\$18	\$19	\$19	\$19	\$19	\$19	\$20
	\$415	\$418	\$422	\$425	\$429	\$433	\$437	\$441	\$445	\$449	\$453	\$457	\$461	\$466	\$471	\$259
	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,470,664	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$8,480,408	\$1,685,661
	\$320,021	\$328,022	\$336,222	\$344,628	\$353,243	\$362,075	\$371,126	\$380,405	\$389,915	\$399,663	\$409,654	\$419,895	\$430,393	\$441,153	\$452,181	\$463,486
	\$530,219	\$535,521	\$540,876	\$546,285	\$551,748	\$557,265	\$562,838	\$568,466	\$574,151	\$579,892	\$585,691	\$591,548	\$597,464	\$603,438	\$609,473	\$615,567

Alternative 4 – 75 Percent Outside Cost Share

Alternative 4	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	
Charge to Cover New O&M (\$/Share)						\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$5	\$5	\$5	
New Power Charge (\$/Share)						\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	
Total Charge (\$/Share)	\$216	\$218	\$221	\$223	\$225	\$239	\$241	\$244	\$246	\$249	\$252	\$254	\$257	\$260	\$263	
Bond Payment	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	
New O&M						\$120,000	\$123,000	\$126,075	\$129,227	\$132,458	\$135,769	\$139,163	\$142,642	\$146,208	\$149,864	
New Power Cost						\$240,000	\$242,400	\$244,824	\$247,272	\$249,745	\$252,242	\$254,765	\$257,312	\$259,886	\$262,484	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$135	\$27
	\$5	\$5	\$5	\$5	\$5	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$7	\$7	\$7	\$7
	\$8	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$10	\$10	\$10	\$10
	\$266	\$269	\$273	\$276	\$279	\$283	\$286	\$290	\$294	\$298	\$302	\$306	\$310	\$314	\$318	\$214
	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,238,368	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$4,243,240	\$842,830
	\$153,610	\$157,450	\$161,387	\$165,421	\$169,557	\$173,796	\$178,141	\$182,594	\$187,159	\$191,838	\$196,634	\$201,550	\$206,589	\$211,753	\$217,047	\$222,473
	\$265,109	\$267,760	\$270,438	\$273,142	\$275,874	\$278,633	\$281,419	\$284,233	\$287,075	\$289,946	\$292,846	\$295,774	\$298,732	\$301,719	\$304,736	\$307,784

Alternative 5 – 0 Percent Outside Cost Share

Alternative 5	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	
Charge to Cover New O&M (\$/Share)						\$51	\$52	\$53	\$55	\$56	\$57	\$59	\$60	\$62	\$63	
New Power Charge (\$/Share)						\$129	\$130	\$132	\$133	\$134	\$136	\$137	\$138	\$140	\$141	
Total Charge (\$/Share)	\$455	\$457	\$459	\$461	\$463	\$645	\$650	\$655	\$660	\$665	\$671	\$676	\$682	\$687	\$693	
Bond Payment	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	
New O&M						\$1,590,000	\$1,629,750	\$1,670,494	\$1,712,256	\$1,755,062	\$1,798,939	\$1,843,913	\$1,890,010	\$1,937,261	\$1,985,692	
New Power Cost						\$4,050,000	\$4,090,500	\$4,131,405	\$4,172,719	\$4,214,446	\$4,256,591	\$4,299,157	\$4,342,148	\$4,385,570	\$4,429,425	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$374	\$159
	\$65	\$67	\$68	\$70	\$72	\$73	\$75	\$77	\$79	\$81	\$83	\$85	\$87	\$89	\$92	\$94
	\$143	\$144	\$145	\$147	\$148	\$150	\$151	\$153	\$154	\$156	\$158	\$159	\$161	\$162	\$164	\$166
	\$699	\$705	\$711	\$717	\$724	\$731	\$738	\$744	\$751	\$758	\$766	\$773	\$781	\$788	\$796	\$589
	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,719,270	\$11,745,255	\$11,745,255	\$11,745,255	\$11,745,255	\$11,745,255	\$11,745,255	\$11,745,255	\$11,745,255	\$11,745,255	\$11,745,255	\$4,974,796
	\$2,035,334	\$2,086,218	\$2,138,373	\$2,191,833	\$2,246,628	\$2,302,794	\$2,360,364	\$2,419,373	\$2,479,857	\$2,541,854	\$2,605,400	\$2,670,535	\$2,737,299	\$2,805,731	\$2,875,874	\$2,947,771
	\$4,473,720	\$4,518,457	\$4,563,641	\$4,609,278	\$4,655,371	\$4,701,924	\$4,748,944	\$4,796,433	\$4,844,397	\$4,892,841	\$4,941,770	\$4,991,187	\$5,041,099	\$5,091,510	\$5,142,425	\$5,193,850

Alternative 5 – 25 Percent Outside Cost Share

Alternative 5	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
<i>Water Charge (\$/Share)</i>	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
<i>Debt Charge (\$/Share)</i>	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	\$280	
<i>Charge to Cover New O&M (\$/Share)</i>						\$38	\$39	\$40	\$41	\$42	\$43	\$44	\$45	\$46	\$47	
<i>New Power Charge (\$/Share)</i>						\$97	\$98	\$99	\$100	\$101	\$102	\$103	\$104	\$105	\$106	
<i>Total Charge (\$/Share)</i>	\$362	\$364	\$366	\$368	\$370	\$507	\$511	\$516	\$520	\$525	\$529	\$534	\$539	\$544	\$549	
<i>Bond Payment</i>	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	
<i>New O&M</i>						\$1,190,000	\$1,219,750	\$1,250,244	\$1,281,500	\$1,313,537	\$1,346,376	\$1,380,035	\$1,414,536	\$1,449,899	\$1,486,147	
<i>New Power Cost</i>						\$3,040,000	\$3,070,400	\$3,101,104	\$3,132,115	\$3,163,436	\$3,195,071	\$3,227,021	\$3,259,291	\$3,291,884	\$3,324,803	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$280	\$280	\$280	\$280	\$280	\$281	\$281	\$281	\$281	\$281	\$281	\$281	\$281	\$281	\$281	\$281
	\$49	\$50	\$51	\$52	\$54	\$55	\$56	\$58	\$59	\$61	\$62	\$64	\$65	\$67	\$69	\$70
	\$107	\$108	\$109	\$110	\$111	\$113	\$114	\$115	\$116	\$117	\$118	\$119	\$121	\$122	\$123	\$124
	\$554	\$559	\$564	\$570	\$575	\$582	\$587	\$593	\$599	\$606	\$612	\$619	\$625	\$632	\$639	\$484
	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,792,488	\$8,811,977	\$8,811,977	\$8,811,977	\$8,811,977	\$8,811,977	\$8,811,977	\$8,811,977	\$8,811,977	\$8,811,977	\$8,811,977	\$3,729,579
	\$1,523,301	\$1,561,383	\$1,600,418	\$1,640,428	\$1,681,439	\$1,723,475	\$1,766,562	\$1,810,726	\$1,855,994	\$1,902,394	\$1,949,954	\$1,998,702	\$2,048,670	\$2,099,887	\$2,152,384	\$2,206,193
	\$3,358,051	\$3,391,632	\$3,425,548	\$3,459,804	\$3,494,402	\$3,529,346	\$3,564,639	\$3,600,285	\$3,636,288	\$3,672,651	\$3,709,378	\$3,746,471	\$3,783,936	\$3,821,776	\$3,859,993	\$3,898,593

Alternative 5 – 50 Percent Outside Cost Share

Alternative 5	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	
Charge to Cover New O&M (\$/Share)						\$26	\$26	\$27	\$27	\$28	\$29	\$30	\$30	\$31	\$32	
New Power Charge (\$/Share)						\$65	\$65	\$66	\$67	\$67	\$68	\$69	\$69	\$70	\$71	
Total Charge (\$/Share)	\$268	\$270	\$272	\$274	\$277	\$369	\$373	\$376	\$380	\$384	\$388	\$392	\$396	\$400	\$404	
Bond Payment	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	
New O&M						\$800,000	\$820,000	\$840,500	\$861,513	\$883,050	\$905,127	\$927,755	\$950,949	\$974,722	\$999,090	
New Power Cost						\$2,030,000	\$2,050,300	\$2,070,803	\$2,091,511	\$2,112,426	\$2,133,550	\$2,154,886	\$2,176,435	\$2,198,199	\$2,220,181	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187	\$187
	\$33	\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40	\$41	\$42	\$43	\$44	\$45	\$46	\$47
	\$71	\$72	\$73	\$74	\$74	\$75	\$76	\$77	\$77	\$78	\$79	\$80	\$81	\$81	\$82	\$83
	\$409	\$413	\$418	\$422	\$427	\$432	\$437	\$443	\$448	\$453	\$459	\$464	\$470	\$476	\$482	\$380
	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,859,635	\$5,872,628	\$5,872,628	\$5,872,628	\$5,872,628	\$5,872,628	\$5,872,628	\$5,872,628	\$5,872,628	\$5,872,628	\$5,872,628	\$2,484,362
	\$1,024,068	\$1,049,669	\$1,075,911	\$1,102,809	\$1,130,379	\$1,158,639	\$1,187,604	\$1,217,295	\$1,247,727	\$1,278,920	\$1,310,893	\$1,343,665	\$1,377,257	\$1,411,689	\$1,446,981	\$1,483,155
	\$2,242,383	\$2,264,807	\$2,287,455	\$2,310,329	\$2,333,433	\$2,356,767	\$2,380,335	\$2,404,138	\$2,428,179	\$2,452,461	\$2,476,986	\$2,501,756	\$2,526,773	\$2,552,041	\$2,577,561	\$2,603,337

Alternative 5 – 75 Percent Outside Cost Share

Alternative 5	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	\$93	
Charge to Cover New O&M (\$/Share)						\$13	\$13	\$13	\$14	\$14	\$14	\$15	\$15	\$16	\$16	
New Power Charge (\$/Share)						\$32	\$33	\$33	\$33	\$34	\$34	\$34	\$35	\$35	\$35	
Total Charge (\$/Share)	\$175	\$177	\$179	\$181	\$183	\$230	\$233	\$236	\$239	\$243	\$246	\$249	\$253	\$256	\$260	
Bond Payment	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	
New O&M						\$400,000	\$410,000	\$420,250	\$430,756	\$441,525	\$452,563	\$463,877	\$475,474	\$487,361	\$499,545	
New Power Cost						\$1,010,000	\$1,020,100	\$1,030,301	\$1,040,604	\$1,051,010	\$1,061,520	\$1,072,135	\$1,082,857	\$1,093,685	\$1,104,622	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$93	\$93	\$93	\$93	\$93	\$94	\$94	\$94	\$94	\$94	\$94	\$94	\$94	\$94	\$94	\$40
	\$16	\$17	\$17	\$18	\$18	\$18	\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$23	\$23	\$24
	\$36	\$36	\$36	\$37	\$37	\$37	\$38	\$38	\$39	\$39	\$39	\$40	\$40	\$40	\$41	\$41
	\$263	\$267	\$271	\$275	\$278	\$283	\$287	\$291	\$296	\$300	\$305	\$309	\$314	\$319	\$324	\$275
	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,932,853	\$2,939,350	\$2,939,350	\$2,939,350	\$2,939,350	\$2,939,350	\$2,939,350	\$2,939,350	\$2,939,350	\$2,939,350	\$2,939,350	\$1,245,217
	\$512,034	\$524,835	\$537,956	\$551,404	\$565,190	\$579,319	\$593,802	\$608,647	\$623,863	\$639,460	\$655,447	\$671,833	\$688,629	\$705,844	\$723,490	\$741,578
	\$4,473,720	\$4,518,457	\$4,563,641	\$4,609,278	\$4,655,371	\$4,701,924	\$4,748,944	\$4,796,433	\$4,844,397	\$4,892,841	\$4,941,770	\$4,991,187	\$5,041,099	\$5,091,510	\$5,142,425	\$5,193,850

Alternative 6a – 0 Percent Outside Cost Share

Alternative 6a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	\$914	
Charge to Cover New O&M (\$/Share)						\$67	\$68	\$70	\$72	\$74	\$75	\$77	\$79	\$81	\$83	
<i>New Power Charge (\$/Share)</i>						\$160	\$162	\$163	\$165	\$167	\$168	\$170	\$172	\$173	\$175	
<i>Total Charge (\$/Share)</i>	\$995	\$997	\$999	\$1,001	\$1,004	\$1,232	\$1,238	\$1,244	\$1,250	\$1,255	\$1,261	\$1,268	\$1,274	\$1,280	\$1,287	
Bond Payment	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	
New O&M						\$2,090,000	\$2,142,250	\$2,195,806	\$2,250,701	\$2,306,969	\$2,364,643	\$2,423,759	\$2,484,353	\$2,546,462	\$2,610,124	
New Power Cost						\$5,020,000	\$5,070,200	\$5,120,902	\$5,172,111	\$5,223,832	\$5,276,070	\$5,328,831	\$5,382,119	\$5,435,941	\$5,490,300	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$914	\$914	\$914	\$914	\$914	\$915	\$915	\$915	\$915	\$915	\$915	\$915	\$915	\$915	\$915	\$287
	\$85	\$87	\$90	\$92	\$94	\$96	\$99	\$101	\$104	\$107	\$109	\$112	\$115	\$118	\$121	\$124
	\$177	\$179	\$180	\$182	\$184	\$186	\$188	\$190	\$191	\$193	\$195	\$197	\$199	\$201	\$203	\$205
	\$1,294	\$1,300	\$1,307	\$1,315	\$1,322	\$1,331	\$1,338	\$1,346	\$1,354	\$1,362	\$1,370	\$1,379	\$1,388	\$1,396	\$1,405	\$786
	\$28,666,669	\$28,666,669	\$28,666,669	\$28,666,669	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$28,712,144	\$9,007,983
	\$2,675,377	\$2,742,261	\$2,810,818	\$2,881,088	\$2,953,115	\$3,026,943	\$3,102,617	\$3,180,182	\$3,259,687	\$3,341,179	\$3,424,708	\$3,510,326	\$3,598,084	\$3,688,036	\$3,780,237	\$3,874,743
	\$5,545,203	\$5,600,655	\$5,656,662	\$5,713,228	\$5,770,361	\$5,828,064	\$5,886,345	\$5,945,208	\$6,004,660	\$6,064,707	\$6,125,354	\$6,186,608	\$6,248,474	\$6,310,958	\$6,374,068	\$6,437,809

Alternative 6a – 25 Percent Outside Cost Share

Alternative 6a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	\$685	
Charge to Cover New O&M (\$/Share)						\$50	\$51	\$53	\$54	\$55	\$57	\$58	\$59	\$61	\$63	
New Power Charge (\$/Share)						\$120	\$121	\$122	\$123	\$125	\$126	\$127	\$129	\$130	\$131	
Total Charge (\$/Share)	\$767	\$769	\$771	\$773	\$775	\$947	\$952	\$957	\$962	\$967	\$972	\$977	\$983	\$988	\$994	
Bond Payment	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	
New O&M						\$1,570,000	\$1,609,250	\$1,649,481	\$1,690,718	\$1,732,986	\$1,776,311	\$1,820,719	\$1,866,237	\$1,912,893	\$1,960,715	
New Power Cost						\$3,760,000	\$3,797,600	\$3,835,576	\$3,873,932	\$3,912,671	\$3,951,798	\$3,991,316	\$4,031,229	\$4,071,541	\$4,112,257	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$685	\$685	\$685	\$685	\$685	\$687	\$687	\$687	\$687	\$687	\$687	\$687	\$687	\$687	\$687	\$215
	\$64	\$66	\$67	\$69	\$71	\$72	\$74	\$76	\$78	\$80	\$82	\$84	\$86	\$88	\$91	\$93
	\$132	\$134	\$135	\$136	\$138	\$139	\$141	\$142	\$143	\$145	\$146	\$148	\$149	\$151	\$152	\$154
	\$1,000	\$1,005	\$1,011	\$1,018	\$1,024	\$1,031	\$1,038	\$1,045	\$1,051	\$1,058	\$1,065	\$1,073	\$1,080	\$1,088	\$1,096	\$632
	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,501,520	\$21,535,626	\$21,535,626	\$21,535,626	\$21,535,626	\$21,535,626	\$21,535,626	\$21,535,626	\$21,535,626	\$21,535,626	\$21,535,626	\$6,755,988
	\$2,009,733	\$2,059,976	\$2,111,475	\$2,164,262	\$2,218,369	\$2,273,828	\$2,330,674	\$2,388,941	\$2,448,664	\$2,509,881	\$2,572,628	\$2,636,944	\$2,702,867	\$2,770,439	\$2,839,700	\$2,910,692
	\$4,153,379	\$4,194,913	\$4,236,862	\$4,279,231	\$4,322,023	\$4,365,243	\$4,408,896	\$4,452,985	\$4,497,515	\$4,542,490	\$4,587,915	\$4,633,794	\$4,680,132	\$4,726,933	\$4,774,202	\$4,821,944

Alternative 6a – 50 Percent Outside Cost Share

Alternative 6a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	\$457	
Charge to Cover New O&M (\$/Share)						\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40	\$41	\$42	
New Power Charge (\$/Share)						\$80	\$81	\$82	\$82	\$83	\$84	\$85	\$86	\$87	\$88	
Total Charge (\$/Share)	\$538	\$540	\$542	\$544	\$547	\$662	\$666	\$670	\$674	\$679	\$683	\$687	\$692	\$696	\$701	
Bond Payment	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	
New O&M						\$1,050,000	\$1,076,250	\$1,103,156	\$1,130,735	\$1,159,004	\$1,187,979	\$1,217,678	\$1,248,120	\$1,279,323	\$1,311,306	
New Power Cost						\$2,510,000	\$2,535,100	\$2,560,451	\$2,586,056	\$2,611,916	\$2,638,035	\$2,664,416	\$2,691,060	\$2,717,970	\$2,745,150	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$457	\$457	\$457	\$457	\$457	\$458	\$458	\$458	\$458	\$458	\$458	\$458	\$458	\$458	\$458	\$144
	\$43	\$44	\$45	\$46	\$47	\$48	\$50	\$51	\$52	\$54	\$55	\$56	\$58	\$59	\$61	\$62
	\$88	\$89	\$90	\$91	\$92	\$93	\$94	\$95	\$96	\$97	\$98	\$99	\$100	\$101	\$102	\$103
	\$706	\$711	\$716	\$721	\$726	\$732	\$738	\$743	\$749	\$755	\$761	\$767	\$773	\$780	\$786	\$479
	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,330,299	\$14,353,036	\$14,353,036	\$14,353,036	\$14,353,036	\$14,353,036	\$14,353,036	\$14,353,036	\$14,353,036	\$14,353,036	\$14,353,036	\$4,503,992
	\$1,344,089	\$1,377,691	\$1,412,133	\$1,447,437	\$1,483,623	\$1,520,713	\$1,558,731	\$1,597,699	\$1,637,642	\$1,678,583	\$1,720,547	\$1,763,561	\$1,807,650	\$1,852,841	\$1,899,162	\$1,946,641
	\$2,772,602	\$2,800,328	\$2,828,331	\$2,856,614	\$2,885,180	\$2,914,032	\$2,943,172	\$2,972,604	\$3,002,330	\$3,032,353	\$3,062,677	\$3,093,304	\$3,124,237	\$3,155,479	\$3,187,034	\$3,218,904

Alternative 6a – 75 Percent Outside Cost Share

Alternative 6a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	\$228	
Charge to Cover New O&M (\$/Share)						\$17	\$17	\$17	\$18	\$18	\$19	\$19	\$20	\$20	\$21	
New Power Charge (\$/Share)						\$40	\$40	\$41	\$41	\$41	\$42	\$42	\$43	\$43	\$44	
Total Charge (\$/Share)	\$310	\$312	\$314	\$316	\$318	\$377	\$380	\$383	\$386	\$390	\$393	\$397	\$400	\$404	\$408	
Bond Payment	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	
New O&M						\$520,000	\$533,000	\$546,325	\$559,983	\$573,983	\$588,332	\$603,041	\$618,117	\$633,570	\$649,409	
New Power Cost						\$1,250,000	\$1,262,500	\$1,275,125	\$1,287,876	\$1,300,755	\$1,313,763	\$1,326,900	\$1,340,169	\$1,353,571	\$1,367,107	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$228	\$228	\$228	\$228	\$228	\$229	\$229	\$229	\$229	\$229	\$229	\$229	\$229	\$229	\$229	\$72
	\$21	\$22	\$22	\$23	\$23	\$24	\$25	\$25	\$26	\$26	\$27	\$28	\$29	\$29	\$30	\$31
	\$44	\$44	\$45	\$45	\$46	\$46	\$47	\$47	\$48	\$48	\$49	\$49	\$50	\$50	\$51	\$51
	\$411	\$415	\$419	\$423	\$428	\$432	\$437	\$441	\$446	\$450	\$455	\$460	\$465	\$470	\$476	\$324
	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,165,149	\$7,176,518	\$7,176,518	\$7,176,518	\$7,176,518	\$7,176,518	\$7,176,518	\$7,176,518	\$7,176,518	\$7,176,518	\$7,176,518	\$2,251,996
	\$665,644	\$682,285	\$699,342	\$716,826	\$734,746	\$753,115	\$771,943	\$791,241	\$811,023	\$831,298	\$852,081	\$873,383	\$895,217	\$917,598	\$940,537	\$964,051
	\$1,380,778	\$1,394,585	\$1,408,531	\$1,422,617	\$1,436,843	\$1,451,211	\$1,465,723	\$1,480,381	\$1,495,184	\$1,510,136	\$1,525,238	\$1,540,490	\$1,555,895	\$1,571,454	\$1,587,168	\$1,603,040

Alternative 6b – 0 Percent Outside Cost Share

Alternative 6b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	\$603	
Charge to Cover New O&M (\$/Share)						\$57	\$58	\$60	\$61	\$63	\$65	\$66	\$68	\$70	\$71	
<i>New Power Charge (\$/Share)</i>						\$142	\$144	\$145	\$146	\$148	\$149	\$151	\$152	\$154	\$155	
<i>Total Charge (\$/Share)</i>	\$684	\$686	\$688	\$691	\$693	\$894	\$899	\$905	\$910	\$915	\$921	\$927	\$933	\$939	\$945	
Bond Payment	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	
New O&M						\$1,790,000	\$1,834,750	\$1,880,619	\$1,927,634	\$1,975,825	\$2,025,221	\$2,075,851	\$2,127,747	\$2,180,941	\$2,235,465	
New Power Cost						\$4,460,000	\$4,504,600	\$4,549,646	\$4,595,142	\$4,641,094	\$4,687,505	\$4,734,380	\$4,781,724	\$4,829,541	\$4,877,836	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$603	\$603	\$603	\$603	\$603	\$604	\$604	\$604	\$604	\$604	\$604	\$604	\$604	\$604	\$604	\$196
	\$73	\$75	\$77	\$79	\$81	\$83	\$85	\$87	\$89	\$91	\$94	\$96	\$98	\$101	\$103	\$106
	\$157	\$159	\$160	\$162	\$163	\$165	\$167	\$168	\$170	\$172	\$173	\$175	\$177	\$179	\$181	\$182
	\$951	\$957	\$964	\$970	\$977	\$985	\$992	\$1,000	\$1,007	\$1,014	\$1,022	\$1,030	\$1,038	\$1,046	\$1,055	\$655
	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,914,780	\$18,960,289	\$18,960,289	\$18,960,289	\$18,960,289	\$18,960,289	\$18,960,289	\$18,960,289	\$18,960,289	\$18,960,289	\$18,960,289	\$6,160,175
	\$2,291,351	\$2,348,635	\$2,407,351	\$2,467,535	\$2,529,223	\$2,592,454	\$2,657,265	\$2,723,697	\$2,791,789	\$2,861,584	\$2,933,123	\$3,006,452	\$3,081,613	\$3,158,653	\$3,237,619	\$3,318,560
	\$4,926,615	\$4,975,881	\$5,025,640	\$5,075,896	\$5,126,655	\$5,177,922	\$5,229,701	\$5,281,998	\$5,334,818	\$5,388,166	\$5,442,048	\$5,496,468	\$5,551,433	\$5,606,947	\$5,663,017	\$5,719,647

Alternative 6b – 25 Percent Outside Cost Share

Alternative 6b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	
Charge to Cover New O&M (\$/Share)						\$43	\$44	\$45	\$46	\$47	\$48	\$50	\$51	\$52	\$53	
<i>New Power Charge (\$/Share)</i>						\$106	\$108	\$109	\$110	\$111	\$112	\$113	\$114	\$115	\$116	
<i>Total Charge (\$/Share)</i>	\$533	\$536	\$538	\$540	\$542	\$693	\$698	\$702	\$707	\$712	\$716	\$721	\$726	\$732	\$737	
Bond Payment	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	
New O&M						\$1,340,000	\$1,373,500	\$1,407,838	\$1,443,033	\$1,479,109	\$1,516,087	\$1,553,989	\$1,592,839	\$1,632,660	\$1,673,476	
New Power Cost						\$3,340,000	\$3,373,400	\$3,407,134	\$3,441,205	\$3,475,617	\$3,510,374	\$3,545,477	\$3,580,932	\$3,616,741	\$3,652,909	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$452	\$452	\$452	\$452	\$452	\$453	\$453	\$453	\$453	\$453	\$453	\$453	\$453	\$453	\$453	\$147
	\$55	\$56	\$57	\$59	\$60	\$62	\$63	\$65	\$67	\$68	\$70	\$72	\$74	\$75	\$77	\$79
	\$118	\$119	\$120	\$121	\$122	\$124	\$125	\$126	\$127	\$129	\$130	\$131	\$133	\$134	\$135	\$137
	\$742	\$748	\$753	\$759	\$765	\$772	\$778	\$784	\$791	\$797	\$804	\$811	\$818	\$825	\$832	\$533
	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,184,567	\$14,218,699	\$14,218,699	\$14,218,699	\$14,218,699	\$14,218,699	\$14,218,699	\$14,218,699	\$14,218,699	\$14,218,699	\$14,218,699	\$4,618,613
	\$1,715,313	\$1,758,196	\$1,802,151	\$1,847,205	\$1,893,385	\$1,940,720	\$1,989,238	\$2,038,968	\$2,089,943	\$2,142,191	\$2,195,746	\$2,250,640	\$2,306,906	\$2,364,578	\$2,423,693	\$2,484,285
	\$3,689,438	\$3,726,332	\$3,763,596	\$3,801,232	\$3,839,244	\$3,877,636	\$3,916,413	\$3,955,577	\$3,995,133	\$4,035,084	\$4,075,435	\$4,116,189	\$4,157,351	\$4,198,924	\$4,240,914	\$4,283,323

Alternative 6b – 50 Percent Outside Cost Share

Alternative 6b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	
Charge to Cover New O&M (\$/Share)						\$28	\$29	\$30	\$31	\$31	\$32	\$33	\$34	\$35	\$35	
<i>New Power Charge (\$/Share)</i>						\$71	\$72	\$73	\$73	\$74	\$75	\$75	\$76	\$77	\$78	
<i>Total Charge (\$/Share)</i>	\$383	\$385	\$387	\$389	\$391	\$493	\$497	\$501	\$504	\$508	\$512	\$517	\$521	\$525	\$530	
Bond Payment	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	
New O&M						\$890,000	\$912,250	\$935,056	\$958,433	\$982,393	\$1,006,953	\$1,032,127	\$1,057,930	\$1,084,379	\$1,111,488	
New Power Cost						\$2,230,000	\$2,252,300	\$2,274,823	\$2,297,571	\$2,320,547	\$2,343,752	\$2,367,190	\$2,390,862	\$2,414,770	\$2,438,918	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$302	\$98
	\$36	\$37	\$38	\$39	\$40	\$41	\$42	\$43	\$44	\$45	\$46	\$48	\$49	\$50	\$51	\$53
	\$79	\$79	\$80	\$81	\$82	\$83	\$83	\$84	\$85	\$86	\$87	\$88	\$88	\$89	\$90	\$91
	\$534	\$539	\$544	\$548	\$553	\$559	\$564	\$570	\$575	\$581	\$586	\$592	\$598	\$604	\$610	\$412
	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,460,426	\$9,483,181	\$9,483,181	\$9,483,181	\$9,483,181	\$9,483,181	\$9,483,181	\$9,483,181	\$9,483,181	\$9,483,181	\$9,483,181	\$3,077,051
	\$1,139,275	\$1,167,757	\$1,196,951	\$1,226,875	\$1,257,547	\$1,288,985	\$1,321,210	\$1,354,240	\$1,388,096	\$1,422,799	\$1,458,369	\$1,494,828	\$1,532,199	\$1,570,504	\$1,609,766	\$1,650,010
	\$2,463,307	\$2,487,940	\$2,512,820	\$2,537,948	\$2,563,327	\$2,588,961	\$2,614,850	\$2,640,999	\$2,667,409	\$2,694,083	\$2,721,024	\$2,748,234	\$2,775,716	\$2,803,474	\$2,831,508	\$2,859,823

Alternative 6b – 75 Percent Outside Cost Share

Alternative 6b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
<i>Water Charge (\$/Share)</i>	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
<i>Debt Charge (\$/Share)</i>	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	
<i>Charge to Cover New O&M (\$/Share)</i>						\$14	\$15	\$15	\$15	\$16	\$16	\$17	\$17	\$17	\$18	
<i>New Power Charge (\$/Share)</i>						\$35	\$36	\$36	\$36	\$37	\$37	\$38	\$38	\$38	\$39	
<i>Total Charge (\$/Share)</i>	\$232	\$234	\$236	\$238	\$241	\$293	\$296	\$299	\$302	\$305	\$308	\$312	\$315	\$319	\$322	
<i>Bond Payment</i>	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	
<i>New O&M</i>						\$450,000	\$461,250	\$472,781	\$484,601	\$496,716	\$509,134	\$521,862	\$534,909	\$548,281	\$561,988	
<i>New Power Cost</i>						\$1,110,000	\$1,121,100	\$1,132,311	\$1,143,634	\$1,155,070	\$1,166,621	\$1,178,287	\$1,190,070	\$1,201,971	\$1,213,991	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$49
	\$18	\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$22	\$23	\$24	\$24	\$25	\$25	\$26	\$27
	\$39	\$39	\$40	\$40	\$41	\$41	\$41	\$42	\$42	\$43	\$43	\$44	\$44	\$44	\$45	\$45
	\$326	\$330	\$334	\$338	\$342	\$346	\$350	\$355	\$359	\$364	\$369	\$373	\$378	\$383	\$388	\$292
	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,730,213	\$4,741,590	\$4,741,590	\$4,741,590	\$4,741,590	\$4,741,590	\$4,741,590	\$4,741,590	\$4,741,590	\$4,741,590	\$4,741,590	\$1,541,562
	\$576,038	\$590,439	\$605,200	\$620,330	\$635,838	\$651,734	\$668,028	\$684,728	\$701,846	\$719,393	\$737,377	\$755,812	\$774,707	\$794,075	\$813,927	\$834,275
	\$1,226,131	\$1,238,392	\$1,250,776	\$1,263,284	\$1,275,916	\$1,288,676	\$1,301,562	\$1,314,578	\$1,327,724	\$1,341,001	\$1,354,411	\$1,367,955	\$1,381,635	\$1,395,451	\$1,409,405	\$1,423,500

Alternative 7a – 0 Percent Outside Cost Share

Alternative 7a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
<i>Water Charge (\$/Share)</i>	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
<i>Debt Charge (\$/Share)</i>	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	
<i>Charge to Cover New O&M (\$/Share)</i>						\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$22	\$23	\$23	
<i>New Power Charge (\$/Share)</i>						\$31	\$31	\$32	\$32	\$32	\$32	\$33	\$33	\$33	\$34	
<i>Total Charge (\$/Share)</i>	\$683	\$685	\$687	\$689	\$691	\$743	\$746	\$750	\$753	\$756	\$759	\$763	\$766	\$770	\$774	
<i>Bond Payment</i>	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	
<i>New O&M</i>						\$590,000	\$604,750	\$619,869	\$635,365	\$651,250	\$667,531	\$684,219	\$701,325	\$718,858	\$736,829	
<i>New Power Cost</i>						\$970,000	\$979,700	\$989,497	\$999,392	\$1,009,386	\$1,019,480	\$1,029,675	\$1,039,971	\$1,050,371	\$1,060,875	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$602	\$1
	\$24	\$25	\$25	\$26	\$27	\$27	\$28	\$29	\$29	\$30	\$31	\$32	\$32	\$33	\$34	\$35
	\$34	\$34	\$35	\$35	\$36	\$36	\$36	\$37	\$37	\$37	\$38	\$38	\$38	\$39	\$39	\$40
	\$778	\$781	\$785	\$790	\$794	\$799	\$803	\$807	\$812	\$817	\$821	\$826	\$831	\$837	\$842	\$246
	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,872,275	\$18,891,764	\$18,891,764	\$18,891,764	\$18,891,764	\$18,891,764	\$18,891,764	\$18,891,764	\$18,891,764	\$18,891,764	\$18,891,764	\$19,489
	\$755,250	\$774,131	\$793,484	\$813,322	\$833,655	\$854,496	\$875,858	\$897,755	\$920,199	\$943,204	\$966,784	\$990,953	\$1,015,727	\$1,041,120	\$1,067,148	\$1,093,827
	\$1,071,483	\$1,082,198	\$1,093,020	\$1,103,950	\$1,114,990	\$1,126,140	\$1,137,401	\$1,148,775	\$1,160,263	\$1,171,866	\$1,183,584	\$1,195,420	\$1,207,374	\$1,219,448	\$1,231,643	\$1,243,959

Alternative 7a – 25 Percent Outside Cost Share

Alternative 7a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	\$451	
Charge to Cover New O&M (\$/Share)						\$14	\$14	\$15	\$15	\$15	\$16	\$16	\$17	\$17	\$18	
<i>New Power Charge (\$/Share)</i>						\$23	\$23	\$23	\$24	\$24	\$24	\$24	\$25	\$25	\$25	
<i>Total Charge (\$/Share)</i>	\$533	\$535	\$537	\$539	\$541	\$580	\$583	\$586	\$589	\$592	\$595	\$599	\$602	\$605	\$609	
Bond Payment	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	
New O&M						\$440,000	\$451,000	\$462,275	\$473,832	\$485,678	\$497,820	\$510,265	\$523,022	\$536,097	\$549,500	
New Power Cost						\$720,000	\$727,200	\$734,472	\$741,817	\$749,235	\$756,727	\$764,295	\$771,937	\$779,657	\$787,453	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$451	\$451	\$451	\$451	\$451	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$452	\$0
	\$18	\$18	\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$22	\$23	\$24	\$24	\$25	\$25	\$26
	\$25	\$26	\$26	\$26	\$26	\$27	\$27	\$27	\$27	\$28	\$28	\$28	\$29	\$29	\$29	\$29
	\$612	\$616	\$620	\$623	\$627	\$632	\$636	\$640	\$644	\$649	\$653	\$658	\$663	\$668	\$673	\$226
	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,154,206	\$14,168,823	\$14,168,823	\$14,168,823	\$14,168,823	\$14,168,823	\$14,168,823	\$14,168,823	\$14,168,823	\$14,168,823	\$14,168,823	\$14,617
	\$563,237	\$577,318	\$591,751	\$606,545	\$621,708	\$637,251	\$653,182	\$669,512	\$686,250	\$703,406	\$720,991	\$739,016	\$757,491	\$776,429	\$795,839	\$815,735
	\$795,328	\$803,281	\$811,314	\$819,427	\$827,621	\$835,898	\$844,257	\$852,699	\$861,226	\$869,838	\$878,537	\$887,322	\$896,195	\$905,157	\$914,209	\$923,351

Alternative 7a – 50 Percent Outside Cost Share

Alternative 7a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	
Charge to Cover New O&M (\$/Share)						\$9	\$9	\$10	\$10	\$10	\$10	\$11	\$11	\$11	\$12	
<i>New Power Charge (\$/Share)</i>						\$15	\$15	\$16	\$16	\$16	\$16	\$16	\$16	\$17	\$17	
<i>Total Charge (\$/Share)</i>	\$382	\$384	\$386	\$388	\$391	\$417	\$420	\$423	\$426	\$428	\$431	\$434	\$438	\$441	\$444	
Bond Payment	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	
New O&M						\$290,000	\$297,250	\$304,681	\$312,298	\$320,106	\$328,108	\$336,311	\$344,719	\$353,337	\$362,170	
New Power Cost						\$480,000	\$484,800	\$489,648	\$494,544	\$499,490	\$504,485	\$509,530	\$514,625	\$519,771	\$524,969	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$301	\$0
	\$12	\$12	\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15	\$15	\$16	\$16	\$16	\$17	\$17
	\$17	\$17	\$17	\$17	\$18	\$18	\$18	\$18	\$18	\$18	\$19	\$19	\$19	\$19	\$19	\$20
	\$447	\$451	\$454	\$458	\$461	\$465	\$469	\$473	\$477	\$481	\$486	\$490	\$494	\$499	\$504	\$208
	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,436,137	\$9,445,882	\$9,445,882	\$9,445,882	\$9,445,882	\$9,445,882	\$9,445,882	\$9,445,882	\$9,445,882	\$9,445,882	\$9,445,882	\$9,745
	\$371,225	\$380,505	\$390,018	\$399,768	\$409,762	\$420,006	\$430,507	\$441,269	\$452,301	\$463,609	\$475,199	\$487,079	\$499,256	\$511,737	\$524,531	\$537,644
	\$530,219	\$535,521	\$540,876	\$546,285	\$551,748	\$557,265	\$562,838	\$568,466	\$574,151	\$579,892	\$585,691	\$591,548	\$597,464	\$603,438	\$609,473	\$615,567

Alternative 7a – 75 Percent Outside Cost Share

Alternative 7a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	\$150	
Charge to Cover New O&M (\$/Share)						\$5	\$5	\$5	\$5	\$5	\$5	\$6	\$6	\$6	\$6	
<i>New Power Charge (\$/Share)</i>						\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	
<i>Total Charge (\$/Share)</i>	\$232	\$234	\$236	\$238	\$240	\$255	\$257	\$260	\$262	\$265	\$268	\$271	\$274	\$277	\$280	
Bond Payment	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	
New O&M						\$150,000	\$153,750	\$157,594	\$161,534	\$165,572	\$169,711	\$173,954	\$178,303	\$182,760	\$187,329	
New Power Cost						\$240,000	\$242,400	\$244,824	\$247,272	\$249,745	\$252,242	\$254,765	\$257,312	\$259,886	\$262,484	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$150	\$150	\$150	\$150	\$150	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$151	\$0
	\$6	\$6	\$6	\$7	\$7	\$7	\$7	\$7	\$7	\$8	\$8	\$8	\$8	\$8	\$9	\$9
	\$8	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$10	\$10	\$10	\$10
	\$283	\$286	\$289	\$293	\$296	\$300	\$303	\$307	\$311	\$314	\$318	\$323	\$327	\$331	\$335	\$189
	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,718,069	\$4,722,941	\$4,722,941	\$4,722,941	\$4,722,941	\$4,722,941	\$4,722,941	\$4,722,941	\$4,722,941	\$4,722,941	\$4,722,941	\$4,872
	\$192,013	\$196,813	\$201,733	\$206,777	\$211,946	\$217,245	\$222,676	\$228,243	\$233,949	\$239,798	\$245,792	\$251,937	\$258,236	\$264,692	\$271,309	\$278,092
	\$265,109	\$267,760	\$270,438	\$273,142	\$275,874	\$278,633	\$281,419	\$284,233	\$287,075	\$289,946	\$292,846	\$295,774	\$298,732	\$301,719	\$304,736	\$307,784

Alternative 7b – 0 Percent Outside Cost Share

Alternative 7b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	\$365	
Charge to Cover New O&M (\$/Share)						\$17	\$17	\$17	\$18	\$18	\$19	\$19	\$20	\$20	\$21	
New Power Charge (\$/Share)						\$13	\$13	\$13	\$13	\$13	\$13	\$14	\$14	\$14	\$14	
<i>Total Charge (\$/Share)</i>	\$446	\$448	\$450	\$453	\$455	\$486	\$489	\$492	\$495	\$498	\$501	\$504	\$508	\$511	\$515	
Bond Payment	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	
New O&M						\$520,000	\$533,000	\$546,325	\$559,983	\$573,983	\$588,332	\$603,041	\$618,117	\$633,570	\$649,409	
New Power Cost						\$400,000	\$404,000	\$408,040	\$412,120	\$416,242	\$420,404	\$424,608	\$428,854	\$433,143	\$437,474	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$365	\$365	\$365	\$365	\$365	\$366	\$366	\$366	\$366	\$366	\$366	\$366	\$366	\$366	\$366	\$184
	\$21	\$22	\$22	\$23	\$23	\$24	\$25	\$25	\$26	\$26	\$27	\$28	\$29	\$29	\$30	\$31
	\$14	\$14	\$14	\$15	\$15	\$15	\$15	\$15	\$15	\$15	\$16	\$16	\$16	\$16	\$16	\$16
	\$518	\$522	\$525	\$529	\$533	\$538	\$542	\$546	\$550	\$555	\$559	\$564	\$569	\$573	\$578	\$402
	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,452,095	\$11,474,849	\$11,474,849	\$11,474,849	\$11,474,849	\$11,474,849	\$11,474,849	\$11,474,849	\$11,474,849	\$11,474,849	\$11,474,849	\$5,773,091
	\$665,644	\$682,285	\$699,342	\$716,826	\$734,746	\$753,115	\$771,943	\$791,241	\$811,023	\$831,298	\$852,081	\$873,383	\$895,217	\$917,598	\$940,537	\$964,051
	\$441,849	\$446,267	\$450,730	\$455,237	\$459,790	\$464,388	\$469,031	\$473,722	\$478,459	\$483,244	\$488,076	\$492,957	\$497,886	\$502,865	\$507,894	\$512,973

Alternative 7b – 25 Percent Outside Cost Share

Alternative 7b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	
Charge to Cover New O&M (\$/Share)						\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15	\$15	\$16	
<i>New Power Charge (\$/Share)</i>						\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	
<i>Total Charge (\$/Share)</i>	\$355	\$357	\$359	\$361	\$364	\$388	\$391	\$393	\$396	\$399	\$402	\$405	\$408	\$411	\$415	
Bond Payment	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	
New O&M						\$390,000	\$399,750	\$409,744	\$419,987	\$430,487	\$441,249	\$452,280	\$463,587	\$475,177	\$487,057	
New Power Cost						\$300,000	\$303,000	\$306,030	\$309,090	\$312,181	\$315,303	\$318,456	\$321,641	\$324,857	\$328,106	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$274	\$138
	\$16	\$16	\$17	\$17	\$18	\$18	\$18	\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$22	\$23
	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$12	\$12	\$12	\$12	\$12	\$12	\$12
	\$418	\$422	\$425	\$429	\$432	\$437	\$441	\$445	\$449	\$453	\$457	\$462	\$466	\$471	\$475	\$344
	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,592,107	\$8,609,173	\$8,609,173	\$8,609,173	\$8,609,173	\$8,609,173	\$8,609,173	\$8,609,173	\$8,609,173	\$8,609,173	\$8,609,173	\$4,328,300
	\$499,233	\$511,714	\$524,507	\$537,619	\$551,060	\$564,836	\$578,957	\$593,431	\$608,267	\$623,474	\$639,060	\$655,037	\$671,413	\$688,198	\$705,403	\$723,038
	\$331,387	\$334,701	\$338,048	\$341,428	\$344,842	\$348,291	\$351,774	\$355,291	\$358,844	\$362,433	\$366,057	\$369,718	\$373,415	\$377,149	\$380,920	\$384,730

Alternative 7b – 50 Percent Outside Cost Share

Alternative 7b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	
Charge to Cover New O&M (\$/Share)						\$8	\$8	\$9	\$9	\$9	\$9	\$10	\$10	\$10	\$10	
<i>New Power Charge (\$/Share)</i>						\$6	\$6	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	
<i>Total Charge (\$/Share)</i>	\$264	\$266	\$268	\$270	\$272	\$289	\$292	\$294	\$297	\$300	\$303	\$306	\$309	\$312	\$315	
Bond Payment	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	
New O&M						\$260,000	\$266,500	\$273,163	\$279,992	\$286,991	\$294,166	\$301,520	\$309,058	\$316,785	\$324,704	
New Power Cost						\$200,000	\$202,000	\$204,020	\$206,060	\$208,121	\$210,202	\$212,304	\$214,427	\$216,571	\$218,737	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$183	\$92
	\$11	\$11	\$11	\$11	\$12	\$12	\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15	\$15	\$15
	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
	\$318	\$321	\$325	\$328	\$332	\$336	\$339	\$343	\$347	\$351	\$355	\$359	\$363	\$368	\$372	\$286
	\$5,726,047	\$5,726,047	\$5,726,047	\$5,726,047	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$5,737,425	\$2,889,581
	\$332,822	\$341,143	\$349,671	\$358,413	\$367,373	\$376,558	\$385,971	\$395,621	\$405,511	\$415,649	\$426,040	\$436,691	\$447,609	\$458,799	\$470,269	\$482,025
	\$220,924	\$223,134	\$225,365	\$227,619	\$229,895	\$232,194	\$234,516	\$236,861	\$239,229	\$241,622	\$244,038	\$246,478	\$248,943	\$251,433	\$253,947	\$256,486

Alternative 7b – 75 Percent Outside Cost Share

Alternative 7b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	\$91	
Charge to Cover New O&M (\$/Share)						\$4	\$4	\$4	\$4	\$5	\$5	\$5	\$5	\$5	\$5	
<i>New Power Charge (\$/Share)</i>						\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	
<i>Total Charge (\$/Share)</i>	\$173	\$175	\$177	\$179	\$181	\$191	\$193	\$196	\$198	\$201	\$203	\$206	\$209	\$212	\$215	
Bond Payment	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	
New O&M						\$130,000	\$133,250	\$136,581	\$139,996	\$143,496	\$147,083	\$150,760	\$154,529	\$158,392	\$162,352	
New Power Cost						\$100,000	\$101,000	\$102,010	\$103,030	\$104,060	\$105,101	\$106,152	\$107,214	\$108,286	\$109,369	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$91	\$91	\$91	\$91	\$91	\$92	\$92	\$92	\$92	\$92	\$92	\$92	\$92	\$92	\$92	\$46
	\$5	\$5	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$7	\$7	\$7	\$7	\$7	\$7	\$8
	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4
	\$218	\$221	\$224	\$228	\$231	\$234	\$238	\$242	\$245	\$249	\$253	\$257	\$261	\$265	\$269	\$228
	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,866,060	\$2,871,748	\$2,871,748	\$2,871,748	\$2,871,748	\$2,871,748	\$2,871,748	\$2,871,748	\$2,871,748	\$2,871,748	\$2,871,748	\$1,444,791
	\$166,411	\$170,571	\$174,836	\$179,206	\$183,687	\$188,279	\$192,986	\$197,810	\$202,756	\$207,825	\$213,020	\$218,346	\$223,804	\$229,399	\$235,134	\$241,013
	\$110,462	\$111,567	\$112,683	\$113,809	\$114,947	\$116,097	\$117,258	\$118,430	\$119,615	\$120,811	\$122,019	\$123,239	\$124,472	\$125,716	\$126,973	\$128,243

Alternative 8a – 0 Percent Outside Cost Share

Alternative 8a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	\$809	
Charge to Cover New O&M (\$/Share)						\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40	\$41	\$42	
<i>New Power Charge (\$/Share)</i>						\$31	\$31	\$32	\$32	\$32	\$32	\$33	\$33	\$33	\$34	
<i>Total Charge (\$/Share)</i>	\$891	\$893	\$895	\$897	\$899	\$966	\$969	\$973	\$976	\$980	\$984	\$988	\$992	\$996	\$1,000	
Bond Payment	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	
New O&M						\$1,050,000	\$1,076,250	\$1,103,156	\$1,130,735	\$1,159,004	\$1,187,979	\$1,217,678	\$1,248,120	\$1,279,323	\$1,311,306	
New Power Cost						\$970,000	\$979,700	\$989,497	\$999,392	\$1,009,386	\$1,019,480	\$1,029,675	\$1,039,971	\$1,050,371	\$1,060,875	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$809	\$809	\$809	\$809	\$809	\$810	\$810	\$810	\$810	\$810	\$810	\$810	\$810	\$810	\$810	\$1
	\$43	\$44	\$45	\$46	\$47	\$48	\$50	\$51	\$52	\$54	\$55	\$56	\$58	\$59	\$61	\$62
	\$34	\$34	\$35	\$35	\$36	\$36	\$36	\$37	\$37	\$37	\$38	\$38	\$38	\$39	\$39	\$40
	\$1,004	\$1,008	\$1,013	\$1,017	\$1,022	\$1,028	\$1,032	\$1,037	\$1,043	\$1,048	\$1,053	\$1,059	\$1,064	\$1,070	\$1,076	\$273
	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,387,703	\$25,407,192	\$25,407,192	\$25,407,192	\$25,407,192	\$25,407,192	\$25,407,192	\$25,407,192	\$25,407,192	\$25,407,192	\$25,407,192	\$19,489
	\$1,344,089	\$1,377,691	\$1,412,133	\$1,447,437	\$1,483,623	\$1,520,713	\$1,558,731	\$1,597,699	\$1,637,642	\$1,678,583	\$1,720,547	\$1,763,561	\$1,807,650	\$1,852,841	\$1,899,162	\$1,946,641
	\$1,071,483	\$1,082,198	\$1,093,020	\$1,103,950	\$1,114,990	\$1,126,140	\$1,137,401	\$1,148,775	\$1,160,263	\$1,171,866	\$1,183,584	\$1,195,420	\$1,207,374	\$1,219,448	\$1,231,643	\$1,243,959

Alternative 8a – 25 Percent Outside Cost Share

Alternative 8a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	
Charge to Cover New O&M (\$/Share)						\$25	\$26	\$26	\$27	\$28	\$28	\$29	\$30	\$31	\$31	
New Power Charge (\$/Share)						\$23	\$23	\$23	\$24	\$24	\$24	\$24	\$25	\$25	\$25	
Total Charge (\$/Share)	\$688	\$690	\$692	\$695	\$697	\$747	\$750	\$754	\$757	\$760	\$764	\$767	\$771	\$775	\$778	
Bond Payment	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	
New O&M						\$790,000	\$809,750	\$829,994	\$850,744	\$872,012	\$893,812	\$916,158	\$939,062	\$962,538	\$986,602	
New Power Cost						\$720,000	\$727,200	\$734,472	\$741,817	\$749,235	\$756,727	\$764,295	\$771,937	\$779,657	\$787,453	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$607	\$0
	\$32	\$33	\$34	\$35	\$36	\$36	\$37	\$38	\$39	\$40	\$41	\$42	\$43	\$44	\$46	\$47
	\$25	\$26	\$26	\$26	\$26	\$27	\$27	\$27	\$27	\$28	\$28	\$28	\$29	\$29	\$29	\$29
	\$782	\$786	\$790	\$795	\$799	\$804	\$808	\$813	\$818	\$823	\$827	\$833	\$838	\$843	\$849	\$247
	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,042,295	\$19,056,912	\$19,056,912	\$19,056,912	\$19,056,912	\$19,056,912	\$19,056,912	\$19,056,912	\$19,056,912	\$19,056,912	\$19,056,912
	\$986,602	\$1,011,267	\$1,036,548	\$1,062,462	\$1,089,024	\$1,116,249	\$1,144,156	\$1,172,759	\$1,202,078	\$1,232,130	\$1,262,934	\$1,294,507	\$1,326,870	\$1,360,041	\$1,394,042	\$1,428,894
	\$787,453	\$795,328	\$803,281	\$811,314	\$819,427	\$827,621	\$835,898	\$844,257	\$852,699	\$861,226	\$869,838	\$878,537	\$887,322	\$896,195	\$905,157	\$914,209

Alternative 8a – 50 Percent Outside Cost Share

Alternative 8a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Starting Total Cash Reserve Balance	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
Annual Total Net Revenue	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
Ending Total Cash Reserve Balance	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	
Charge to Cover New O&M (\$/Share)						\$17	\$17	\$18	\$18	\$19	\$19	\$20	\$20	\$21	\$21	
New Power Charge (\$/Share)						\$15	\$15	\$16	\$16	\$16	\$16	\$16	\$16	\$17	\$17	
Total Charge (\$/Share)	\$486	\$488	\$490	\$492	\$494	\$529	\$532	\$535	\$538	\$541	\$544	\$547	\$551	\$554	\$557	
Bond Payment	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	
New O&M						\$530,000	\$543,250	\$556,831	\$570,752	\$585,021	\$599,646	\$614,638	\$630,003	\$645,754	\$661,897	
New Power Cost						\$480,000	\$484,800	\$489,648	\$494,544	\$499,490	\$504,485	\$509,530	\$514,625	\$519,771	\$524,969	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$405	\$0
	\$22	\$22	\$23	\$23	\$24	\$24	\$25	\$26	\$26	\$27	\$28	\$28	\$29	\$30	\$31	\$31
	\$17	\$17	\$17	\$17	\$18	\$18	\$18	\$18	\$18	\$18	\$19	\$19	\$19	\$19	\$19	\$20
	\$561	\$565	\$568	\$572	\$576	\$581	\$585	\$589	\$593	\$598	\$602	\$607	\$612	\$616	\$621	\$222
	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,696,887	\$12,706,632	\$12,706,632	\$12,706,632	\$12,706,632	\$12,706,632	\$12,706,632	\$12,706,632	\$12,706,632	\$12,706,632	\$12,706,632
	\$661,897	\$678,445	\$695,406	\$712,791	\$730,611	\$748,876	\$767,598	\$786,788	\$806,458	\$826,619	\$847,285	\$868,467	\$890,178	\$912,433	\$935,244	\$958,625
	\$524,969	\$530,219	\$535,521	\$540,876	\$546,285	\$551,748	\$557,265	\$562,838	\$568,466	\$574,151	\$579,892	\$585,691	\$591,548	\$597,464	\$603,438	\$609,473

Alternative 8a – 75 Percent Outside Cost Share

Alternative 8a	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	
Charge to Cover New O&M (\$/Share)						\$8	\$8	\$9	\$9	\$9	\$9	\$10	\$10	\$10	\$10	
<i>New Power Charge (\$/Share)</i>						\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	
<i>Total Charge (\$/Share)</i>	\$284	\$286	\$288	\$290	\$292	\$310	\$313	\$315	\$318	\$321	\$324	\$327	\$330	\$333	\$336	
Bond Payment	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	
New O&M						\$260,000	\$266,500	\$273,163	\$279,992	\$286,991	\$294,166	\$301,520	\$309,058	\$316,785	\$324,704	
New Power Cost						\$240,000	\$242,400	\$244,824	\$247,272	\$249,745	\$252,242	\$254,765	\$257,312	\$259,886	\$262,484	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$202	\$0
	\$11	\$11	\$11	\$11	\$12	\$12	\$12	\$13	\$13	\$13	\$14	\$14	\$14	\$15	\$15	\$15
	\$8	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$9	\$10	\$10	\$10	\$10
	\$339	\$342	\$346	\$349	\$353	\$357	\$360	\$364	\$368	\$372	\$376	\$380	\$385	\$389	\$394	\$196
	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,345,408	\$6,350,280	\$6,350,280	\$6,350,280	\$6,350,280	\$6,350,280	\$6,350,280	\$6,350,280	\$6,350,280	\$6,350,280	\$6,350,280
	\$324,704	\$332,822	\$341,143	\$349,671	\$358,413	\$367,373	\$376,558	\$385,971	\$395,621	\$405,511	\$415,649	\$426,040	\$436,691	\$447,609	\$458,799	\$470,269
	\$262,484	\$265,109	\$267,760	\$270,438	\$273,142	\$275,874	\$278,633	\$281,419	\$284,233	\$287,075	\$289,946	\$292,846	\$295,774	\$298,732	\$301,719	\$304,736

Alternative 8b – 0 Percent Outside Cost Share

Alternative 8b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	-\$16,319	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	\$533	
Charge to Cover New O&M (\$/Share)						\$28	\$29	\$30	\$31	\$31	\$32	\$33	\$34	\$35	\$35	
<i>New Power Charge (\$/Share)</i>						\$13	\$13	\$13	\$13	\$13	\$13	\$14	\$14	\$14	\$14	
<i>Total Charge (\$/Share)</i>	\$615	\$617	\$619	\$621	\$623	\$666	\$670	\$673	\$676	\$679	\$683	\$686	\$690	\$694	\$698	
Bond Payment	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	
New O&M						\$890,000	\$912,250	\$935,056	\$958,433	\$982,393	\$1,006,953	\$1,032,127	\$1,057,930	\$1,084,379	\$1,111,488	
New Power Cost						\$400,000	\$404,000	\$408,040	\$412,120	\$416,242	\$420,404	\$424,608	\$428,854	\$433,143	\$437,474	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$533	\$533	\$533	\$533	\$533	\$534	\$534	\$534	\$534	\$534	\$534	\$534	\$534	\$534	\$534	\$137
	\$36	\$37	\$38	\$39	\$40	\$41	\$42	\$43	\$44	\$45	\$46	\$48	\$49	\$50	\$51	\$53
	\$14	\$14	\$14	\$15	\$15	\$15	\$15	\$15	\$15	\$15	\$16	\$16	\$16	\$16	\$16	\$16
	\$701	\$705	\$710	\$714	\$718	\$723	\$728	\$732	\$737	\$742	\$747	\$752	\$757	\$762	\$768	\$376
	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,728,802	\$16,751,557	\$16,751,557	\$16,751,557	\$16,751,557	\$16,751,557	\$16,751,557	\$16,751,557	\$16,751,557	\$16,751,557	\$16,751,557	\$4,291,483
	\$1,139,275	\$1,167,757	\$1,196,951	\$1,226,875	\$1,257,547	\$1,288,985	\$1,321,210	\$1,354,240	\$1,388,096	\$1,422,799	\$1,458,369	\$1,494,828	\$1,532,199	\$1,570,504	\$1,609,766	\$1,650,010
	\$441,849	\$446,267	\$450,730	\$455,237	\$459,790	\$464,388	\$469,031	\$473,722	\$478,459	\$483,244	\$488,076	\$492,957	\$497,886	\$502,865	\$507,894	\$512,973

Alternative 8b – 25 Percent Outside Cost Share

Alternative 8b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	
Charge to Cover New O&M (\$/Share)						\$21	\$22	\$22	\$23	\$24	\$24	\$25	\$25	\$26	\$27	
<i>New Power Charge (\$/Share)</i>						\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	
<i>Total Charge (\$/Share)</i>	\$481	\$483	\$485	\$487	\$490	\$523	\$526	\$529	\$532	\$535	\$538	\$542	\$545	\$548	\$552	
Bond Payment	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	
New O&M						\$670,000	\$686,750	\$703,919	\$721,517	\$739,555	\$758,044	\$776,995	\$796,419	\$816,330	\$836,738	
New Power Cost						\$300,000	\$303,000	\$306,030	\$309,090	\$312,181	\$315,303	\$318,456	\$321,641	\$324,857	\$328,106	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$103
	\$27	\$28	\$29	\$29	\$30	\$31	\$32	\$32	\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40
	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$12	\$12	\$12	\$12	\$12	\$12	\$12
	\$556	\$559	\$563	\$567	\$571	\$576	\$580	\$584	\$589	\$593	\$598	\$603	\$607	\$612	\$618	\$325
	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,545,083	\$12,562,149	\$12,562,149	\$12,562,149	\$12,562,149	\$12,562,149	\$12,562,149	\$12,562,149	\$12,562,149	\$12,562,149	\$12,562,149	\$3,217,095
	\$857,657	\$879,098	\$901,076	\$923,602	\$946,692	\$970,360	\$994,619	\$1,019,484	\$1,044,971	\$1,071,096	\$1,097,873	\$1,125,320	\$1,153,453	\$1,182,289	\$1,211,846	\$1,242,143
	\$331,387	\$334,701	\$338,048	\$341,428	\$344,842	\$348,291	\$351,774	\$355,291	\$358,844	\$362,433	\$366,057	\$369,718	\$373,415	\$377,149	\$380,920	\$384,730

Alternative 8b – 50 Percent Outside Cost Share

Alternative 8b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	
Charge to Cover New O&M (\$/Share)						\$14	\$15	\$15	\$15	\$16	\$16	\$17	\$17	\$17	\$18	
<i>New Power Charge (\$/Share)</i>						\$6	\$6	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	
<i>Total Charge (\$/Share)</i>	\$348	\$350	\$352	\$354	\$356	\$379	\$382	\$385	\$388	\$391	\$394	\$397	\$400	\$403	\$406	
Bond Payment	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	
New O&M						\$450,000	\$461,250	\$472,781	\$484,601	\$496,716	\$509,134	\$521,862	\$534,909	\$548,281	\$561,988	
New Power Cost						\$200,000	\$202,000	\$204,020	\$206,060	\$208,121	\$210,202	\$212,304	\$214,427	\$216,571	\$218,737	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$267	\$68
	\$18	\$19	\$19	\$20	\$20	\$21	\$21	\$22	\$22	\$23	\$24	\$24	\$25	\$25	\$26	\$27
	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8	\$8
	\$410	\$413	\$417	\$420	\$424	\$428	\$432	\$436	\$440	\$445	\$449	\$453	\$458	\$463	\$467	\$274
	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,361,365	\$8,372,742	\$8,372,742	\$8,372,742	\$8,372,742	\$8,372,742	\$8,372,742	\$8,372,742	\$8,372,742	\$8,372,742	\$8,372,742	\$2,148,778
	\$576,038	\$590,439	\$605,200	\$620,330	\$635,838	\$651,734	\$668,028	\$684,728	\$701,846	\$719,393	\$737,377	\$755,812	\$774,707	\$794,075	\$813,927	\$834,275
	\$220,924	\$223,134	\$225,365	\$227,619	\$229,895	\$232,194	\$234,516	\$236,861	\$239,229	\$241,622	\$244,038	\$246,478	\$248,943	\$251,433	\$253,947	\$256,486

Alternative 8b – 75 Percent Outside Cost Share

Alternative 8b	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
<i>Starting Total Cash Reserve Balance</i>	\$830,245	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	
<i>Annual Total Net Revenue</i>	(\$16,319)	\$207,759	\$202,951	\$200,183	\$197,163	\$193,905	\$190,400	\$186,639	\$182,616	\$178,319	\$173,741	\$168,872	\$163,703	\$158,223	\$152,422	
<i>Ending Total Cash Reserve Balance</i>	\$813,926	\$1,021,685	\$1,224,636	\$1,424,819	\$1,621,982	\$1,815,887	\$2,006,287	\$2,192,926	\$2,375,542	\$2,553,861	\$2,727,602	\$2,896,474	\$3,060,177	\$3,218,400	\$3,370,822	
Water Charge (\$/Share)	\$81	\$83	\$85	\$88	\$90	\$92	\$94	\$97	\$99	\$102	\$104	\$107	\$109	\$112	\$115	
Debt Charge (\$/Share)	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	\$133	
Charge to Cover New O&M (\$/Share)						\$7	\$7	\$7	\$8	\$8	\$8	\$8	\$8	\$9	\$9	
<i>New Power Charge (\$/Share)</i>						\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	
<i>Total Charge (\$/Share)</i>	\$215	\$217	\$219	\$221	\$223	\$236	\$238	\$241	\$243	\$246	\$249	\$252	\$254	\$257	\$260	
Bond Payment	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	
New O&M						\$220,000	\$225,500	\$231,138	\$236,916	\$242,839	\$248,910	\$255,133	\$261,511	\$268,049	\$274,750	
New Power Cost						\$100,000	\$101,000	\$102,010	\$103,030	\$104,060	\$105,101	\$106,152	\$107,214	\$108,286	\$109,369	
	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	\$3,370,822	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869
	\$146,291	\$139,818	\$132,993	\$125,804	\$118,239	\$110,288	\$101,937	\$93,174	\$83,987	\$74,362	\$64,286	\$53,745	\$42,725	\$31,211	\$19,188	\$6,641
	\$3,517,113	\$3,656,931	\$3,789,924	\$3,915,728	\$4,033,967	\$4,144,254	\$4,246,191	\$4,339,365	\$4,423,352	\$4,497,714	\$4,562,000	\$4,615,745	\$4,658,470	\$4,689,681	\$4,708,869	\$4,715,510
	\$118	\$121	\$124	\$127	\$130	\$133	\$137	\$140	\$143	\$147	\$151	\$154	\$158	\$162	\$166	\$171
	\$133	\$133	\$133	\$133	\$133	\$134	\$134	\$134	\$134	\$134	\$134	\$134	\$134	\$134	\$134	\$134
	\$9	\$9	\$9	\$10	\$10	\$10	\$10	\$11	\$11	\$11	\$11	\$12	\$12	\$12	\$13	\$13
	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4
	\$264	\$267	\$270	\$273	\$277	\$281	\$284	\$288	\$292	\$296	\$300	\$304	\$308	\$312	\$317	\$222
	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,183,719	\$4,189,407	\$4,189,407	\$4,189,407	\$4,189,407	\$4,189,407	\$4,189,407	\$4,189,407	\$4,189,407	\$4,189,407	\$4,189,407	\$1,074,389
	\$281,619	\$288,659	\$295,876	\$303,272	\$310,854	\$318,626	\$326,591	\$334,756	\$343,125	\$351,703	\$360,496	\$369,508	\$378,746	\$388,214	\$397,920	\$407,868
	\$110,462	\$111,567	\$112,683	\$113,809	\$114,947	\$116,097	\$117,258	\$118,430	\$119,615	\$120,811	\$122,019	\$123,239	\$124,472	\$125,716	\$126,973	\$128,243