Florida Consolidated Ditch Company

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3/31/2021

Kirk Russell, P.E.
Colorado Water Conservation Board
1313 Sherman Street, Room 718
Denver, CO 80203
kirk.russell@state.co.us

Re: Final Deliverable for Florida Canal Diversion Structure Rehabilitation Project: Phase 1 (Contract CORE No. POGG1 2018-947)

Dear Kirk,

The Florida Consolidated Ditch Company (FCDC) is pleased to provide the Colorado Water Conservation Board (CWCB) with this final letter report documenting the completion of the Florida Canal Diversion Structure Rehabilitation Project: Phase 1 (Project). The CWCB awarded the FCDC funding for this Project on May 17, 2018 (Contract CORE No. POGG1 2018-947) and granted an extension request on April 4, 2019 and on April 28, 2020. The grant will currently expire on May 31, 2021. The following provides a summary of the information requested by the CWCB as part of the Final Deliverable for the Project.

Summary of Water Activity Project

Phase 1 of the Florida Canal Diversion Structure Rehabilitation Project was a multi-purpose project to provide preliminary design concepts and prepare a feasibility study for repairs to the Florida Canal Diversion Structure (Diversion Structure). The Diversion Structure delivers pre-compact irrigation water rights to the Florida Canal headgate for irrigation of 6,900 acres on the Florida Mesa. The current Diversion Structure is a low head dam that impedes upstream fish and aquatic organism passage. The water supply source is the Florida River. The Florida Canal provides water to Pastorius Reservoir which is a State Wildlife Area, as well as irrigation water to land on which alfalfa, spring wheat, orchard, small grains, and grass pasture are grown.

The WSRA funding was used for Phase 1 of the Project including an evaluation of environmental and cultural permitting needs, background work for easements and right-of-way acquisition, and development of a CWCB loan feasibility study for funding the final design and construction phase of the Project. The final Project loan feasibility study is provided as Attachment A.

Obstacles Encountered and Overcome

The biggest challenge encountered during Phase 1 of the Project included coordination with the private landowner on which the existing Diversion Structure is built. At first, the landowner was

not supportive of the larger structure footprint required to provide a safer and more fish friendly Diversion Structure. With the support of the local Colorado Parks and Wildlife (CPW) staff and our engineering consultant, Wright Water Engineers, Inc. (WWE), the Project stakeholders were able to agree on a conceptual design approach that balances the multi-purpose Project components and requests from the landowner. Multiple stakeholder discussions helped facilitate the development of a construction easement agreement between the FCDC and the Landowner, which is in the process of being finalized.

Proposed Budget vs. Actual Budget

The proposed budget for the Project's CWCB grant application was $213,000. As shown on Pay Request No.3, the total project cost was $215,761.39.

Confirmation of Match Commitments

The FCDC confirms that all match commitments were made and are accounted for as noted in our Payment Request.

Project Documentation

The Project loan feasibility study in included as Attachment A. The CWCB deliverables listed in the Project grant award letter dated May 18, 2018, include: 1) Conceptual drawings, 2) Basis of Design Report, and 3) Final Loan Feasibility Study. These deliverables are included in Attachment A.

The following summarizes the review process that occurred during development the Project deliverables:

- CPW: Jim White, Aquatic Biologist, and Ryan Unterreiner, Southwest Water Resources Specialist, were consulted during development of the Project Basis of Design Report. CPW staff reviewed early drafts of the Basis of Design Report and provided feedback to WWE. Attachment A provides the final Project Basis of Design Report that was reviewed and accepted by the Project stakeholders.

  CPW staff were also consulted during the conceptual design development phase. After CPW's final review of the conceptual drawings provided in Attachment A, CPW staff indicated the Project's preferred alternative approach should result in salmonid passage and is a big improvement over the current condition. CPW asked for the opportunity to provide additional feedback during the final design phase to achieve the best possible outcome for fish given the design constraints.

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- Landowner: The landowner's representative worked with the Project stakeholder group, including CPW and the FCDC, to reach a mutually agreeable approach to the conceptual design provided in Attachment A. Involving the landowner during the conceptual design development phase was critical to the Project and helped lead to the development of a construction easement agreement between the FCDC and the Landowner, which is in the process of being finalized.

- Sunnyside Gravel and Excavation, LLC (Sunnyside): General contractor Alton Hess, president of Sunnyside, reviewed and provided feedback regarding the Project Alternative cost estimates and the conceptual design drawings provided in Attachment A. Recommendations from Sunnyside regarding current unit construction costs were incorporated into the construction costs estimates provided for each alternative.

Thank you for your consideration of this final report, please let us know if you need any additional information or documentation.

Sincerely,

Roger Cole, President

Attachments:

Attachment A. Florida Consolidated Ditch Company – Florida Canal Diversion Structure Rehabilitation Project – CWCB Loan Feasibility Study

Florida Canal Diversion Structure Rehabilitation Project

CWCB Loan Feasibility Study

Prepared for:

Florida Consolidated Ditch Company

Wright Water Engineers, Inc.

July 2020

061-110.141

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Table of Acronyms Used in This Report

Acronym	Term
AF	Acre Feet
cfs	Cubic Feet per Second
CDWR	Colorado Division of Water Resources
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board
CWP	Colorado Water Plan
FCDC	Florida Consolidation Ditch Company
FWCD	Florida Water Conservancy District
FWS	United States Fish and Wildlife Service
ISF	Instream Flow
SBR	Southwestern Basin Roundtable
SFHA	Special Flood Hazard Area
SWCD	Southwestern Water Conservation District
TNC	The Nature Conservancy
USBR	United States Bureau of Reclamation
WSRA	Water Supply Reserve Account
WWE	Wright Water Engineers, Inc.

EXECUTIVE SUMMARY

The Florida Canal Diversion Structure (Diversion Structure) is an approximately eight-foot tall vertical check structure constructed during the turn of the century and is located on the Florida River in La Plata County, CO approximately 9 miles downstream from Lemon Reservoir and 6.5 miles northeast of the City of Durango (see Figure 1). The Florida River is tributary to the Animas River. The Diversion Structure is owned and operated by the Florida Consolidated Ditch Company (FCDC) and is decreed to divert 80 cfs for the irrigation of over 8,000 acres in La Plata County (see Figure 2). Water rights in the Florida Canal are Pre-Compact water rights with appropriation dates ranging from 1888 to 1907.

The Diversion Structure also maintains water deliveries to Pastorius Reservoir, an irrigation water storage and reregulating reservoir that provides wildlife benefits located within the FCDC service area (see Figure 2). Pastorius Reservoir is a Colorado Parks and Wildlife (CPW) State Wildlife Area.

There are two Colorado Water Conservation Board (CWCB) instream flow water rights in the Florida River beginning at the outlet of Lemon Reservoir (upstream terminus) and its confluence with the Animas River (downstream terminus) (see Figure 2). The existing Diversion Structure serves as a fish barrier and restricts fish passage over an 11.5-mile reach of the Florida River (48.8 acres). Furthermore, the Diversion Structure acts as a low head dam and may pose a recreational drowning hazard.

In early 2017, portions of the timber-faced Diversion Structure began to fail. Emergency repairs to the Diversion Structure were installed in May 2017. The emergency repairs are temporary, and the Diversion Structure requires a more permanent rehabilitation solution.

The purpose of the Diversion Structure Rehabilitation Project (the Project) is to provide more permanent long-term repair to the Diversion Structure using design and financing approaches to:

1) Provide a more reliable Diversion Structure to protect pre-compact water rights decreed for irrigation.
2) Reduce drowning hazard potential and increase river safety.
3) Provide a more reliable source of water for Pastorius Reservoir, a CPW State Wildlife Area.
4) Enhance the aquatic habitat in the natural stream corridor by promoting fish passage and aquatic connectivity.

The project sponsor is the FCDC and project partners include: the Florida Water Conservancy District (FWCD), the Colorado Water Conservation Board (CWCB), the Southwest Basin Roundtable (SW BASIN), Colorado Parks and Wildlife (CPW), Southwestern Water Conservation District (SWCD), The Nature Conservancy (TNC), and the landowner where the Diversion Structure is currently located. Wright Water Engineers, Inc. (WWE) prepared this feasibility study on behalf of the FCDC.

Phase 2 of the Project, which includes final engineering design, environmental services, bidding, and construction of the Project, is estimated to cost approximately $1,200,000. The environmental and safety benefits of the Preferred Project Alternative are estimated to increase the overall cost

of the Project by approximately $500,000 or 71 percent higher than the Repair and Replace in Kind Alternative. Phase 2 of the project was already awarded $175,000 in grant funds from a combination of the Agricultural Projects and Environmental and Recreational Project funding pools under the Colorado Water Plan. FCDC is requesting a CWCB loan of $1,025,000 in the event additional grant monies cannot be secured for the Project. The proposed funding approach for the Preferred Alternative is summarized in Table 5. The purpose of this Feasibility Study is to support the FCDC's $1,025,000 loan request. The FCDC continues to seek additional grant funding and if successful the requested loan amount may reduce.

This Feasibility Study outlines three Project alternatives plus a no-action alternative:

- Alternative No. 1: No-action
- Alternative No. 2: Repair and replace in-kind
- Alternative No. 3: Structure Rehabilitation with Fish Bypass
- Preferred Alternative No. 4: Combination Cross Vane and Newbury Riffle Structure

The preferred Project alternative selected is Alternative No. 4 (Preferred Alternative). The Preferred Alternative balances the requests of the landowner with the multi-purpose objectives to provide a safer and more fish friendly structure. The general approach to for the Preferred Alternative is as follows:

- Buttress the existing Diversion structure with an engineered rock fill.
- Install a combination of engineered cross-vane drop structures and Newbury Riffles downstream of the existing structure to enhance fish passage/connectivity and remove low head dam conditions under a range of flow conditions.
- Install a screened intake structure to the Florida Canal Headgate to help minimize debris accumulation in front of the headgate and reduce headgate maintenance requirements.

Additional benefits of this Preferred Alternative include instream erosion control, sediment reduction, increased irrigation water delivery efficiency, and lower annual operation and maintenance (O&M) costs.

The Project is feasible from a technical, legal, environmental, and cultural resource perspective. The Preferred Alternative is located within a construction easement which is mutually agreeable to the FCDC and the landowner, there are no known environmental or cultural resource issues to prevent construction of the Preferred Alternative.

The financial feasibility of the Project is based on $125,000 in grants and a $1,025,000 CWCB loan. Based on the results of this Feasibility Study, the FCDC Board would like to move forward final engineering design and environmental permitting of the Preferred Alternative. WWE's opinion of probable final engineering design, bidding services, construction observation and construction costs for the Preferred Alternative is approximately $1,200,000. The cost opinion for the construction is based on a 30 percent design level as per CWCB guidelines and includes a 30 percent contingency. Please note that unforeseen issues during final design, environmental, or construction may change the overall cost of the Project.

1.0 PROJECT BACKGROUND AND PURPOSE

1.1 Location

The Florida Canal Diversion Structure (Diversion Structure) is located on the Florida River, a tributary of the Animas River in La Plata County, Colorado, approximately 6.5 miles northeast of the City of Durango (Figure 1). The Diversion Structure is part of the Florida Consolidated Ditch Company irrigation water delivery system (see Figure 2).

1.2 Background

The existing Diversion Structure constructed around the turn of the century is an approximately eight-feet tall concrete, steel, and wood structure located in the Florida River. The Diversion Structure currently acts as a low head dam; a flow impoundment that creates hazardous recirculating currents downstream. The existing Diversion Structure also acts as a fish barrier and prohibits the movement of aquatic species above and below the structure. Additionally, the existing Diversion Structure causes the Florida Canal headgate to become inundated with sediment and frequently requires debris removal disturbing the streambed.

The FCDC is a mutual ditch company that provides water to 293 shareholders (6,200 shares) serving between 15,000 and 18,000 acres of irrigated agriculture through two canals; the Florida Farmers Ditch and the Florida Canal (see Figure 2). This project is for the Florida Canal Diversion Structure, which is located upstream of the Florida Farmers Ditch (see Figure 2). In total, the FCDC operates 86.5 miles of canals, ditches and laterals, and delivers approximately 43,250 acre-feet (AF) of water per year to its shareholders. FCDC water rights are summarized in Table 1. The Florida Canal water rights total 80 cfs and are Pre-Compact water rights.

The Florida Canal also delivers water to Pastorius Reservoir, an irrigation water storage and reregulating reservoir located within the FCDC service area (see Figure 2). Pastorius Reservoir is a Colorado Parks and Wildlife (CPW) State Wildlife Area.

The Diversion Structure and FCDC service area are located within the Florida Water Conservancy District (FWCD) boundary. The FWCD manages the United States Bureau of Reclamation (USBR) Florida Project, which includes Lemon Dam and Reservoir. Streamflow in the Florida River is regulated by Lemon Dam, located approximately nine river miles upstream from the Diversion Structure. In addition to the natural streamflow diverted by the FCDC for its adjudicated water rights, the FCDC conveys Florida Project Water (Project Water) released from the Lemon Reservoir for irrigation purposes within the FCDC and FWCD service area.

The Diversion Structure diverts both natural streamflow and storage water released from Lemon Dam into the Florida Canal. Even though the Diversion Structure diverts project storage water, the Diversion Structure is not a Florida Project Facility and according to the USBR, is not eligible for USBR MOA funding.

In early 2017, a portion of the timber face of Diversion Structure began to fail. Emergency repairs to the Diversion were installed in May 2017, however the emergency repairs are temporary, and the Diversion Structure requires a more permanent rehabilitation solution.

1.3 Purpose

The purpose of the Project is to provide a more permanent long-term repair solution to the Diversion Structure using a design approach which enhances the natural stream corridor and improves safety, fish passage, and aquatic connectivity. The Project is a unique multi-purpose project that addresses multiple consumptive and non-consumptive needs on the Florida Mesa and within the Florida River watershed. The primary goals of the Project are as follows:

- Protect pre-Compact water rights entitlement by rehabilitating the Diversion Structure allowing for reliable delivery of pre-Compact water rights through the Florida Canal.
- Promote sustainability and watershed health through improving aging infrastructure that maintains open space and provides recreational opportunities throughout La Plata County.
- Increases the reliability of water supply to Pastorius Reservoir, an important State Wildlife Area with recreational opportunities including fishing, non-motorized boating, hunting, hiking, and wildlife viewing.
- Firm agricultural irrigation water supplies, promote agricultural viability and productivity, and provide increased drought resistance for the Florida Mesa during dry years.
- Address non-consumptive recreational and environmental needs through restoration of the Diversion Structure via the following:

    - Replace the existing low head dam with a structure that is safer for river users.
    - Provide better habitat connectivity for an approximately 11.5-mile reach of the Florida River by enhancing fish passage through project design and implementation. The Florida River is an important fishery in the Southwest Basin as the CWCB holds two ISF water rights that extend from below Lemon Dam downstream to the confluence with the Animas River. The reach where the Project is located is identified as special value waters in SWSI because of the CWCB ISF water rights.

1.4 Study Area Description

The Florida River is a tributary to the Animas River, which is a tributary to the San Juan River (see Figure 1). The headwaters of the Florida River are located in the Weminuche Wilderness Area. The Florida River drains the southern flanks of the Needle Mountains located within the broader San Juan Mountain Range.

From its headwaters, the river flows in a general southward direction 15.5 miles to Lemon Reservoir, which is located 14 miles northeast of Durango in La Plata County. The Florida River downstream of Lemon Dam runs southwest approximately 43 miles to the confluence with the Animas River near Bondad, Colorado. The Florida River gage at Bondad, Colorado is located approximately ½ mile north of the confluence of the Florida and Animas Rivers. The total size of the Florida River watershed is 221 square miles. The Florida River basin area above Lemon Reservoir is approximately 53 square miles.

The elevation of the Florida River drainage area ranges from over 13,000 feet at its headwaters to 6,000 feet near the confluence with the Animas. The Florida River basin is divided into three zones: an alpine zone above Lemon Reservoir, a transitional zone between Lemon Reservoir and

Highway 160, and a dry rangeland zone to the south of Highway 160. The irrigated agricultural areas are located in the transitional and dry rangeland zones.

The area of Florida River stream habitat improvement is approximately 48.8 acres, from Lemon Dam downstream to the Florida Farmers Ditch Diversion Structure. The CWCB holds two instream flow (ISF) water rights on the Florida River that extend from below Lemon Dam downstream to the confluence with the Animas River (see Figure 2).

1.5 Previous Studies

a. The United States Bureau of Reclamation conducted a Rehabilitation and Betterment Study (R&B Study) in 1988 that identified and recommended improvements to the Florida Mesa canals' conveyance system (with consolidation of four individual Florida Mesa canal companies in 2014, this system is now referred to as the FCDC conveyance system). Since the 1988 R&B Study, the FCDC has improved approximately 9.5 miles of its 82-mile long system through lining and reconstruction.

b. The USBR published a history of the Florida Canal in 1995. It contains a summary of the location and history of the valley, both culturally and geologically. The author then describes the reasoning behind construction of the canal and focuses on current water uses, with a steady focus on sustainability.

c. The FCDC, together with the FWCD, developed a Water Conservation and Management Plan in 2006 that identified the need for additional augmentation, municipal and industrial water supplies in the Florida River basin. This plan also identified several sections of the FCDC conveyance system as high priorities for efficiency improvements.

d. The USBR conducted a surface water budget report, entitled Florida Mesa Surface Water Budget Florida Water Conservancy District 1994, which estimated the area of irrigated acreage and used that estimate as the basis for calculating the surface water budget. The report stated that the net combined diversion demand from both the Florida Canal and the Florida Farmers' Ditch ranged from 33,040 AF per year to 57,333 AF per year with an average 46,124 AF per year. An analysis on a monthly time step was conducted in the FWCD/FCDC joint 2006 Water Conservation and Management Plan using the 46,124 AF average from the 1994 USBR report and Colorado Department of Water Resources (CDWR) diversion records which indicated water shortfalls within the FCDC ranging from approximately 1,750 AF in an average year to 33,500 AF during a dry year (2002).

e. In October 2010, Wright Water Engineers, Inc. (WWE) authored a ditch loss study based on the Florida Water Conservancy District Water Conservation and Management Plan (2006). This study evaluated historical flow data, and canal operations and maintenance (O&M) records to identify sections of the conveyance system, primarily north of Pastorius Reservoir, experiencing significant water loss. The study also examined soil characteristics and prioritized sections that had high soil permeability. The study provided a review of potential environmental impacts of performing improvements and conceptual cost estimates to make the improvements. As a result of this study, the FCDC developed a ditch improvement program for the study area and has used this since 2010 as its basis for prioritizing ditch improvement projects and seeking funding for the ditch improvement projects.

f. Between 2012 and 2013 the USBR conducted a pre- and post-ditch loss study on one of the ditch improvement (ditch lining) projects to quantify water savings from the improvements. The *Water Savings Verification Results for Florida Farmers Ditch Company Canal Lining Project*, USBR Report WEEG-11-141, was published in October 2014. The report found a 95% savings from the pre-Project seepage water loss (12.77 AF per day reduced to 0.63 AF per day), or a total average irrigation season savings of roughly 1,500 AF per year.

g. A recent update for the FWCD's 2015 Water Conservation and Management Plan, based on CDWR diversion records through 2014, found water shortfalls have increased to 3,000 AF in an average year, likely due to drier climate conditions since 2006. It is worth noting that the net diversion demand estimates made in the 1994 USBR report precede nearly all of the water efficiency improvements that the FCDC has made to its water delivery system. The 2015 Water Conservation and Management Plan identified several sections of the FCDC conveyance system as high priorities for improvement, one of which was the Florida Canal Diversion Structure.

h. As part of the Statewide Water Supply Initiative, SW BASIN, in its July 2014 needs assessment report, observed the importance of Projects that address multiple purposes. The report recommended integration of consumptive and non-consumptive needs into its Identified Projects and Processes (IPP) database in order to provide SW BASIN with tools to explore opportunities that meet both need types.

2.0 PROJECT SPONSOR

The FCDC is a non-profit mutual ditch corporation established in 2014 with the consolidation of the four original Florida Mesa Canal companies:

- Florida Canal Company
- Florida Canal Enlargement Company
- Florida Farmers Ditch Company
- Florida Cooperative Ditch Company

The FCDC has a board of directors, a secretary, and two ditch riders. The Florida Farmers Ditch Company and Florida Canal Company were formed in 1889 and 1893, respectively. They were established to provide adjudicated irrigation water to agricultural water users on the Florida Mesa near Durango, Colorado. To expand delivery of agricultural water to farmers on the Florida Mesa, the Florida Enlargement Canal Company and Florida Co-Operative Ditch Company were formed in 1908 and 1910, respectively.

Upon merging the individual companies into the FCDC, the consolidation and distribution were divided by their individual shares: Florida Farmers Ditch (Class A), Florida Canal (Class B), Florida Canal Enlargement (Class C), and Florida Cooperative Ditch (Class D) shares. The FCDC Articles of Incorporation and By-Laws are attached in Appendix A.

3.0 WATER RIGHTS

A summary of FCDC water rights are shown in Table 1. The FCDC has two diversion structures: Florida Canal and Florida Farmers Ditch. The Florida Canal diverts water under the Florida Canal (Share B) and Florida Canal Enlargement (Share C) water rights. The Florida Farmers Ditch

diverts water under the Florida Farmers Ditch (Share A) and Florida Co-operative Ditch (Share D) water rights. Nearly all FCDC's water rights are pre-Colorado compact (pre-1922) water rights, except for a 110 cfs water right for the diversion of water for Florida Project Water Users. In addition, the Florida Canal delivers water to the Pastorius Reservoir, a decreed reservoir under the Florida Canal water rights.

The CWCB have two ISF water rights decreed on the Florida River, W-1763-77 and W-1764-77. The ISF water right decreed in Case Number W-1763-77 is for the Florida River from Lemon Reservoir to confluence with Salt Creek for 7 CFS from July 1st to October 14th, and 14 CFS from October 15th to June 30th. The ISF water right decreed in Case Number W-1764-77 is for the Florida River from confluence with Salt Creek to the Animas River for 12 CFS from July 1st to October 14th, and 20 CFS from October 15th to June 30th.

3.1 Water Availability

Over the 1964 through 2014 period, the FCDC diverted between 13,500 AF of water in a dry year to over 58,500 AF of water in a wet year. The diversions between 1964 and 2014 average 43,250 AF per year.

3.2 Water Supply Demands

According to the Colorado Decision Support System, the FCDC serves 15,000 to over 18,000 acres of irrigated agriculture, of which over 8,000 acres is decreed under the Florida Canal water right. In 2001, a FWCD crop census reported a crop distribution of pasture grass (45 percent), other hay (36.5 percent), and alfalfa hay (13.4 percent). Other crops, at less than 2 percent of total acreage each, included silage, wheat, barley, corn, and oats.

4.0 PROJECT ALTERNATIVES ANALYSIS

The purpose of the Florida Canal Diversion Structure Rehabilitation Project is to provide more permanent long-term repair to the Diversion Structure using design approaches to maintain historical diversions to the Florida Canal while reducing sediment and debris from entering the canal headgate, promote recreational safety, enhance the natural stream corridor, and enhance fish passage and connectivity.

WWE consulted with the project stakeholders, including the FCDC, CPW, and the landowner regarding Project design alternatives. This core stakeholder group held multiple meetings to arrive at the group's Preferred Alternative. During these stakeholder meetings, the following alternatives were reviewed and discussed:

- Alternative No. 1: No-action
- Alternative No. 2: Repair and replace in-kind
- Alternative No. 3: Structure Rehabilitation with Fish Bypass
- Preferred Alternative No. 4: Combination Cross Vane and Newbury Riffle Structure

Appendix B provides the BOD Report developed by WWE with input from CPW. The BOD Report outlines the design criteria for the Project to promote components related to structure safety and fish passage. The ability of each alternative to meet this criterion was considered by the project

stakeholders. The following sections provide a summary of each of the alternatives evaluated by the stakeholders and a summary of their pros and cons.

4.1 Alternative 1: No-Action

The first alternative evaluated is No-Action. In early 2017, a portion of the timber face of Diversion Structure began to fail. Emergency repairs to the Diversion Structure were installed in May 2017, however the emergency repairs are temporary in nature. In the event the No-Action alternative is selected, the Diversion Structure will require more regular monitoring and ongoing emergency repair. The pros and cons of this Alternative 1 are summarized as follows:

Pros:

- The short-term cost of Alternative 1 is lowest; however, it does not outweigh the negative economic or environmental impacts summarized in the cons.

Cons:

- In the event of a catastrophic failure, the irrigation water supply for over 8,000 irrigated acres would be interrupted, causing a significant economic impact to the irrigators who rely on water delivered by the Florida Canal.
- A failure would create a head cut in the Florida River that would travel upstream and erode the stream resulting in negative environmental impacts both upstream and downstream of the diversion structure.
- Requires more frequent monitoring and repairs to the Diversion Structure, increasing the O&M costs to the FCDC and its shareholders.
- Increased negative impacts to the river due to the need for more frequent heavy equipment maintenance activities in and near the river.
- Does not meet the design criteria established in the BOD Report.
- Maintains its function as a low head dam and potential safety hazard.
- Maintains its function as a fish barrier in the Florida River.

The No-Action Alternative is not preferred by the FCDC and the Project stakeholders and WWE did not prepare a cost estimate for this alternative.

4.2 Alternative 2: Repair and Replace In-Kind

The second alternative evaluated is Repair and Replace In-Kind. Alternative 2 considers the installation of a reinforced concrete diversion structure immediately downstream of the existing structure (Figure 3). This alternative effectively buttresses and replaces the existing structure. However, this approach only mitigates the structural integrity issues of the Diversion Structure, safety and fish passage issues are not addressed. The pros and cons of this Alternative 2 are summarized as follows:

Pros:

- Lower cost compared to Alternatives 3 and 4.

- Buttressing the existing structure with an engineered reinforced concrete diversion structure provides an effective long-term solution to maintaining diversions to the Florida Canal.

Cons:

- The structure remains potentially unsafe and continues to act as a low head dam.
- In-kind replacement of the existing structure increases the liability of the FCDC and the design engineer because the replacement structure remains unsafe.
- Does not meet the design criteria established in the BOD Report.
- The structure remains a fish barrier.
- Replacing the structure is not aesthetically pleasing given its surrounding environment.

Alternative 2 is not preferred by the Project stakeholders as it does not meet the multi-purpose goals of this Project. WWE's opinion of probable final engineering design, bidding services, construction observation and construction costs for Alternative 2 is approximately $700,000 (see Table 2).

4.3 Alternative 3: Repair and Replace In-Kind with Fish Bypass Channel

The third alternative evaluated is Repair and Replace In-Kind with Fish Bypass Channel. Alternative 3 considers repairing and replacing the existing Diversion Structure as discussed in Alternative 2, with the addition of a fish bypass channel that allows fish to pass the structure promoting habitat connectivity. The proposed location of the bypass channel is on the left bank (south bank) of the Diversion Structure. The bypass channel starts approximately 110 feet upstream around the Diversion Structure and connects back with the Florida River 50 feet downstream. The bypass channel is approximately 230 feet long, 10 feet wide, and contains 6 Cross-Vane step pool structures. The proposed pools run roughly 20 feet long with a minimum pool depth of 1 foot. The pros and cons of this Alternative 3 are summarized as follows:

Pros:

- Lower cost compared to Alternative 4.
- Buttressing the existing structure with an engineered reinforced concrete diversion structure provides an effective long-term solution to maintaining diversions to the Florida Canal.
- Promotes fish passage around the structure.

Cons:

- The structure remains unsafe and continues to act as a low head dam.
- In-kind replacement of the existing structure increases the liability of the FCDC and the design engineer because the replacement structure remains unsafe.
- Does not meet the safety considerations criteria established in the BOD Report.
- The bypass channel impacts the landowners headgate in the Florida River.

While this alternative provides fish passage, it does not address the issue of safety at the diversion structure. Alternative 3 is not preferred by the Project stakeholders as it does not meet the multi-purpose goals of this Project and WWE did not prepare a cost estimate for this alternative.

4.4 Selected Alternative 4: Newbury Riffle and Cross Vane Structure

The fourth alternative evaluated is the construction of a combination of Newbury riffles and cross vane structures downstream of the existing Diversion Structure (Figure 4). This alternative strikes a balance between the structure footprint requests of the landowner and the safety and fish passage criteria outlined in the BOD Report. Newbury riffles create a series of riffle runs and step-pools to facilitate fish passage, similar to a fish ladder. The drawback with Newbury riffles is they require more stream length to step the stream channel down from the diversion structure. Cross vane structures focus stream flow energy to the center of the channel and create a small drop immediately downstream of the structure. They can be spaced tighter than the Newbury riffle, and can facilitate fish passage assuming the downstream drop is passable by the fishery population. The pros and cons of this Alternative 4 are summarized as follows:

Pros:

- Provides an effective long-term solution to maintaining diversions to the Florida Canal.
- Provides a comparatively safer structure.
- Promotes instream fish passage upstream and downstream of the diversion structure.
- Can be designed to meet the target safety and fish passage criteria established in the BOD Report.
- Meets the multi-purpose project goals of the project stakeholders.
- Meets the structure footprint requirements of the landowner.
- Controlled energy dissipation downstream of the diversion structure helps limit streambank erosion and promote more natural sediment transport processes.
- Provides more opportunity to install an aesthetically pleasing structure.

Cons:

- Highest cost when comparted to the other Alternatives.

Alternative 4 is the Project stakeholders Preferred Alternative since it meets the multi-purpose goals of this Project. WWE's opinion of probable final engineering design, bidding services, construction observation and construction costs for Alternative 4 is approximately $1,200,000 (see Table 3). It is worth noting the cost estimate of the Preferred Project Alternative is approximately $500,000 higher (approximately 71% higher) when compared to Alternative 2 Repair and Replace in Kind. This increased cost is directly attributable to the multi-purpose benefits of the Preferred Alternative, including environmental benefits and increased recreational safety.

5.0 PREFERRED ALTERNATIVE: ALTERNATIVE 4

5.1 Project Description

The Project seeks to reestablish the connection between the top of the existing Diversion Structure and the downstream streambed while maintaining historical diversions to the Florida Canal headgate. Alternative 4: Newbury Riffle and Cross Vane Structure (Preferred Alternative) meets its multipurpose objectives to maintain historical diversions to the Florida Canal, provide a comparably safer structure, and provides fish passage.

The primary project components of the Preferred Alternative include the following (see Figure 4):

- The existing Diversion Structure is buttressed with an engineered rock fill. A series of engineered Newbury riffles and cross vanes are installed downstream of the structure to step the grade down from the Diversion Structure to the streambed. At this time, WWE anticipates anchoring the boulders used to form the Newbury riffles and cross vanes into the bedrock below the streambed. This anchoring system helps limit movement and settlement of the boulders.
- The sequence of Newbury riffles and cross vanes starts at the diversion structure and continues for approximately 150 feet downstream. The gradual step-down in grade from the top of the Diversion Structure and the downstream streambed are intended to eliminate the low head dam conditions and provide an opportunity for fish passage. The elevation of the Diversion Structure will remain the same to minimize potential impacts to historical diversions.
- Florida Canal Headgate Structure improvements consist of a spillway weir and screen system to help reduce trash and debris accumulation at the front of the canal headgates.
- The existing Florida Canal headgate structure allows the operator to deliver any excess water delivery back to the Florida River through a wastegate. The engineered rock fill buries the existing wastegate outlet where it daylights into the river. The Preferred Alternative requires construction of a new wastegate structure located further downstream in Florida Canal to maintain this operational ability.

5.2 Conceptual Design Plan

Conceptual Design Plans (CDPs) for the Selected Alternative are provided in Figure 4. The CDPs encouraged stakeholder participation early in the design process and helped to assess Project feasibility. The CDPs consider the design criteria outlined in the BOD Report provided in Appendix B. The BOD Report includes input from FCDC staff, Colorado Parks and Wildlife, and the landowner on which the Diversion Structure is located. Key design parameters identified in the BOD Report include the following:

- **Fish Passage Performance**: All fish passage design criteria should be met between a non-irrigation season low flow of approximately 10 cfs and a typical irrigation season flow of approximately 200 cfs.
- **Fish Passage Design Criteria:** Maintain flow velocities of 6 feet-per-second (fps) within the fish passage performance flow range. Limit the elevation difference between structures

to 1 foot in order to meet fish jumping criteria. Maintain a pool depth to jump height ratio of 1.5.

- **Structure Safety:** Considerations for structure safety should be evaluated for flows up to approximately 1,000 cfs.
- **Structure Stability:** Since Lemon Dam is a flood control facility, the structure should be designed to remain stable during a flow of approximately 1,500 cfs, which approximately corresponds to the 50-year flood event, and is greater than the largest release made from Lemon Dam (based on available data).
- **Structure Length:** Limit the length of the structure (downstream of the existing diversion structure) to approximately 150 feet.

5.3 Field Investigations

Topographic Survey Data: The site topography, existing structure elevations, and property boundary information shown in the CDPs is from a series of surveys conducted by Goff Engineering and Surveying, Inc. Approximately five surveys were conducted between July 2017 and February 2019. Initial survey visits focused on site and below water topography, existing structure conditions and property boundaries, while later visits focused on collecting additional information requested by the landowner.

Geotechnical Engineering Study: A geotechnical engineering study (geotechnical study) performed at the project site in August 2018 is provided in Attachment A of the Basis of Design Report (see Appendix B). The geotechnical study provides information regarding the subsurface conditions around the existing Diversion Structure and geotechnical design parameters for rehabilitating the existing diversion structure. The conceptual design intends to use grouted rock anchors to serve as the foundation for the Newbury riffle and cross vane structures. The geotechnical study found a competent formational sandstone material for embedding the grouted rock anchors between 5 feet and 8 feet below the stream channel. Please see the geotechnical study provided in Appendix B for more details on grouted rock anchor geotechnical design parameters.

5.4 Right-of-Way/Land Requirements

The FCDC has an existing easement associated with the Florida Canal, the Florida Canal Headgate, and the Diversion Structure. The FCDC and WWE worked diligently with the landowner where the Diversion Structure is located, and all parties have mutually agreed to the conceptual design approach proposed for the Preferred Project Alternative and its associated construction footprint. Currently, WWE and the FCDC do not foresee any issues obtaining the necessary easements or Right's-Of-Way for construction of the Preferred Project.

5.5 Opinion of Probable Costs

See Table 3 for WWE's opinion of probable final engineering design, permitting and construction costs for the Preferred Alternative. This opinion was developed using the conceptual design provided in Figure 4. Table 3 provides a breakdown of estimated grouted anchor drop, grouted pool drop, riprap, scour hole fill, earthwork, and streambank restoration quantities. The opinion of probable costs is based on available data at the time of this report was prepared and may not reflect the bidding climate when actual construction bids are received. The opinion of probable

construction costs will be updated after final design is preformed and additional Project details are defined.

5.6 Schedule

A planning level project implementation schedule is provided in Table 4. The schedule outlines The Project from final design to anticipated Project closeout. WWE estimates an approximately 54-month Project timeline from CWCB approval. Activities during the first 30 months consist of applications, board voting, securing additional funding, and final design. Construction is anticipated to begin post irrigation season 2022 and is estimated to last 6 months. Post-construction monitoring is expected to take place during the final 18 months including reclamation monitoring and preparation of a final report. Please note the proposed implementation schedule is preliminary and may be subject to change as the Project progresses.

5.7 Environmental and Cultural Impacts

5.7.1 *Environmental Permitting Requirements*

5.7.1.1 Clear Water Act (CWA) Section 404 Permit

The Florida Canal is an agricultural irrigation water delivery conveyance system located in the Florida River basin in southwest Colorado and provides water for use including, but not limited to, commercial agricultural products including stock, alfalfa hay, grass hay, and pasture grass (see Figure 1). The Project is required to continue the Florida Canal's ability to divert water from the Florida River, including Florida Project water released from Lemon Reservoir. However, the Florida Canal is not considered a Florida Project Facility by the United States Bureau of Reclamation (USBR) and federal funding was not available under the United States Bureau of Reclamation MOA program.

The Project consists of rebuilding the existing structure to meet the intent of the originally constructed diversion structure. Because the Project consists of maintaining/replacing an existing serviceable structure that is used for normal farming, it appears to be exempt from Clean Water Act Section 404 regulatory requirements under Section 404(f).

The primary objective of the Project is to rehabilitate an existing irrigation diversion structure to meet the intent of the originally constructed diversion structure. While the Preferred Alternative incorporates safety and fish passage design components, it is intended to maintain an existing serviceable structure that is used for commercial agricultural farming. Currently, it appears the Project is exempt from Clean Water Act Section 404 regulatory requirements und Section 404(f)[1].

5.7.1.2 Federal Permitting - Section 7 Endangered Species Act

In the event the Project receives federal funding it may be subject to conformance with Section 7 of the Endangered Species Act (ESA) (which requires affirmative demonstration of ESA

[1]WWE evaluated the potential that the Project would be subject to the 'Recapture Provision' and opined that neither of the two necessary tests were met (i.e., the Project will not put Waters of the U.S. to new uses and the Project does not restrict the flow or extent of Waters of the U.S. beyond current levels.). WWE coordinated with legal council on this opinion.

compliance for Projects requiring a Federal action). If required, the Project's obligations under the ESA are to avoid the 'take' of a listed threatened or endangered species. The ESA and its implementing regulations in Title 50 of the Code of Federal Regulations (CFR) Section 17 prohibit the take of any fish or wildlife species that is federally listed as threatened or endangered without prior approval pursuant to either Section 7 or Section 10 of the ESA. The FWS is responsible for the implementation of the ESA. Section 3 of the ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct" (16 USC § 1532 (19)). Harm, in this case, means an act that kills or injures a federally listed wildlife species and "may include significant habitat modification or…significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." To harass means to perform "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering" (50 CFR §17.3). In addition, Section 9 of the ESA details generally prohibited acts, and Section 11 provides for both civil and criminal penalties for violators regarding species that are federally listed as threatened or endangered.

In the event the Project does not receive federal funding, WWE does not foresee the need for the Project to confirm to Section 7 of the ESA because the project is likely exempt from Clean Water Act Section 404 regulatory requirements. Under this scenario there is no significant nexus between the Project and federal regulatory requirements if federal funds are not received.

As discussed, the applicant approached USBR on this project and found that USBR MOA funding could not be used for this project, additional federal funding is not anticipated for this project.

5.7.2 *Preliminary Biological Assessment*

Wright Water Engineers (WWE) conducted a preliminary biological resources assessment for the Project in July 2018. The purpose of this assessment was to (1) document findings of the biological resources assessment (including a desktop analysis and field survey); (2) determine to what extent, if any, the proposed Project may affect United States Fish and Wildlife Service (FWS) federally listed endangered, threatened, proposed, or candidate species; and proposed or designated critical habitat; (3) provide preliminary recommendations for management of biological resources, including measures to avoid, minimize, or mitigate impacts, where practicable. The determinations made in the preliminary assessment were based on pre-field research, observations from the field surveys, the professional judgment of experienced biologists, and information obtained through coordination with the FWS. Based on the results of a preliminary project screening using the FWS Information for Planning and Conservation (IPaC) tool, the primary listed species that could potentially be affected by the Project is the New Mexico Meadow Jumping Mouse (NMMJM) (*Zapus Hudsonius Luteus*). Based on this result, WWE's evaluation focused on the Project's potential to affect the New Mexico Meadow Jumping Mouse.

5.7.2.1 Desktop Review

Prior to conducting fieldwork, WWE biologists compiled a list of federally threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur in the Project Area. This information was obtained from the IPaC System (USFWS, 2018).

The IPaC identified six federally threatened, endangered, or proposed species that potentially occur in the Project Area:

- New Mexico Meadow Jumping Mouse (*Zapus Hudsonius Luteus*),
- Mexican Spotted Owl (*Strix Occidentalis Lucida*),
- Southwestern Willow Flycatcher (*Empidonax Traillii Extimus*),
- Western Yellow-Billed Cuckoo (*Coccyzus Americanus Occidentalis*),
- Colorado Pikeminnow (*Ptychocheilus Lucius*),
- Razorback Sucker (*Xyrauchen Texanus*).

No designated or proposed critical habitat is located in the Project Area. The nearest designated critical habitat for the NMMJM occurs along the Florida River approximately 1.9 miles southwest (downstream) of the Project Area and continues downstream for approximately 7.3 miles (see Figure 5).

5.7.2.2 Field Survey

WWE biologist conducted a pedestrian biological survey within and adjacent to the proposed Project construction limits in July 2018. The surveys consisted of walking the riverbank and documenting wetlands, vegetation, wildlife, wildlife signs, bird vocalizations, unique habitat, and potential habitat for federally listed or other protected species. Binoculars were used to aid in wildlife observations and identification. Photographs were taken to document site conditions and representative habitat.

5.7.2.3 Evaluation of Federally Listed Species

The IPaC identified six federally threatened, endangered, or proposed species that potentially occur in the Project Area. The potential for each species to occur in the Project Area was evaluated based upon the habitat associations of each species including historic occurrences and known distributions, habitat requirements, and elevation ranges, compared to the habitat in the Project Area observed during field surveys. Based on these methods, one species— the NMMJM—was determined to have potential to occur in the Project Area. The other five potential species of concern identified by the IPaC were eliminated from detailed evaluation due to the absence of suitable habitat in the Project Area.

5.7.2.4 NMMJM Background Habitat Requirements

The NMMJM is endemic to Arizona, southern Colorado, and New Mexico and is currently restricted to isolated areas in the San Juan, Sangre de Cristo, Jemez, Sacramento, and White mountains and portions of the Rio Grande Valley. It is generally considered to occur at elevations between 4,500 and 8,000 feet; however, historical populations have been found at higher elevations, including areas around Tres Rios (8,750 feet) and the Taos Ski Valley (9,600 feet) (Frey, 2008).

This subspecies is considered a habitat specialist with specific requirements necessary for survival and completion of its life history (USFWS 2014b). In addition, the NMMJM hibernates 8 to 9 months of the year beginning in mid-September; therefore, individuals must breed, raise young, and store sufficient fat reserves to survive the next hibernation period during their short active season in the summer (USFWS, 2014b).

Suitable habitat for the NMMJM includes tall (average stubble height of herbaceous vegetation of at least 24 inches) and dense herbaceous riparian vegetation cover with at least 25 percent cover (USFWS, 2015). The NMMJM's habitat requirements include a wide variety of forbs and graminoids including, but not limited to, the following: field mint (*Mentha Arvense*), asters (*Aster Spp.*), cutleaf coneflower (*Rudbeckia Laciniata*), common three-square (*Schoenoplectus Pungens*), spikerush (*Eleocharis Macrostachya*), and beaked sedge (*Carex Rostrata*). Rushes (*Juncus spp. and Scirpus spp.*) and numerous species of grasses such as bluegrass (*Poa Spp.*), slender wheatgrass (*Elymus Trachycaulus*), and brome (*Bromus Spp.*) are also commonly associated with this subspecies. Suitable habitat for the NMMJM should also contain sufficient seasonally available or perennially flowing waters to support the growth of tall, dense, riparian herbaceous plants and maintain moist soils (USFWS, 2015).

Recent research suggests that the NMMJM nests and hibernates in upland areas adjacent to riparian habitats up gradient of the 100-year floodplain (USFWS 2020b). Hibernacula are most likely below ground at the base of shrubs and trees in dry upland habitats (USFWS 2014b). Recent ongoing field research has used radio telemetry on NMMJM in an effort to locate hibernacula and measure habitat characteristics of these sites. No confirmed hibernacula have been located yet from these efforts. However, there has been cautious reporting of four probable hibernacula in the Sambrito Creek Critical Habitat Unit in southern Colorado (Zahratka 2016). These sites ranged between about 3.3 to 33 ft (1 to 10 m) from perennial flowing water in upslope habitat. While this is preliminary information, it does indicate that the NMMJM may be choosing hibernation sites outside of floodplains (USFWS 2020a).

The City of Durango recently received a 404-permit associated with improvements to an existing intake structure on the Florida River, located approximately 4.5 miles upstream of the Project Area. To avoid a take for construction during the intake improvements, the FWS required the City of Durango to perform active construction activities in suitable habitat area to begin after September 15 and cease before May 1 (Ecosphere, 2017). This construction window is consistent with the FCDC's preferred construction period for the Project during the non-irrigation season.

5.7.2.5 Critical Habitat

When the NMMJM was listed as an endangered species, FWS initiated a rulemaking to designate critical habitat for the species. As it relates to the Project, FWS designated a reach of the Florida River as critical habitat, beginning upstream of the northern boundary of the Southern Ute Indian Tribe reservation and extending north/upstream to a location that is roughly 1.9-miles downstream from the Project. The upstream extent of Unit 7 of the NMMJM critical habitat was established in the critical habitat final rule because USFWS determined that the originally proposed critical habitat, which extended north and closer toward the Project, was in an area of low habitat value. At page 14279 of the Federal Register Volume 81, No. 51, March 16, 2016, USFWS identifies that: "the proposed upstream boundary of Unit 7 does not contain the physical and biological features essential to the conservation of the NMMJM. It is unoccupied, and is not likely to provide habitat in the future." The adopted Unit 7 critical habitat area is roughly 1.9 miles downstream from the Project.

5.7.2.6 WWE Evaluation of Potential NMMJM Habitat in Project Area

WWE conducted an evaluation of the Project Area in July 2018 relative to the potential NMMJM habitat within the permanent and temporary impact areas. This evaluation focused primarily on documenting and mapping the vegetation communities and land uses present in the area.

Based on WWE's evaluation, the Florida Canal diversion structure and immediate surrounds are not likely to provide high quality habitat that is used by the NMMJM. These areas include open water, gravel surfaces, and a maintained irrigation canal. Within the Project construction limits, there are some areas of scrub-shrub and emergent herbaceous wetlands which may be temporarily impacted during construction. Based on the relatively small nature of the potential habitat within the Project Area, combined with the Project's geographic isolation from other potential habitat areas, the potential for the Project Area to be occupied by the NMMJM appears to be reduced when compared to downstream reaches of the Florida River.

WWE did not conduct trapping within the Project area, which is an additional measure that can be used to confirm the presence or absence of the NMMJM. Trapping is not required for this project, however, services of a biologist to assist with environmental items including ESA is included in the Phase 2 design and construction project budget.

5.7.2.7 Direct and Indirect Effects

The Project Area contains some areas of potentially suitable NMMJM habitat which may be temporarily impacted during construction. Due to the relatively small nature of the suitable habitat within the Project Area, the lack of habitat connectivity between patches of suitable habitat, and the geographic isolation from other potential habitat areas (see Figure 5), the Project Area is not likely to provide significant habitat that is used by the NMMJM.

Short-term impacts include vegetation removal, construction traffic, and noise. To minimize impacts to vegetation, and potential NMMJM habitat, construction should be scheduled between September 15 and May 1—outside the growing season for plants—which would allow crushed vegetation to recover by the next growing season. Overall impacts to suitable NMMJM habitat are expected to be insignificant given the area of proposed impact.

5.7.2.8 Recommended Conservation Measures

Reasonable measures to reduce potential impacts to the NMMJM are recommended as part of this Project. These measures include:

- Develop a Project design which minimizes, to the extent practicable, the amount of temporary and permanent disturbance within the mapped suitable habitat areas.
    - Overall Project impacts to riparian areas should be minimal. Project impacts within the channel are not viewed as having the same impact to the NMMJM as impacts to the vegetated wetland areas surrounding the channel.
    - Limit Project access to the river channel to specific and marked locations.
    - Limit Project work in riparian areas outside the riverbanks to a minimum. Good practices include:

  - Locate equipment staging and materials storage in existing graveled or non-suitable NMMJM habitat areas.
  - When feasible, use mats to distribute equipment weight and to minimize ground disturbance.
  - Limit access points to work areas to the extent practicable.

- Educate Project contractors regarding the NMMJM, including the ability to identify the NMMJM, potential NMMJM habitat, and NMMJM nests. Implement a protocol for stopping work and engaging a qualified biologist if the NMMJM or a NMMJM nest is encountered.
- Time the construction to minimize impacts. Construction activities in suitable habitat should begin after September 15 and cease before May 1. During the hibernation period between September 15 and May 1, the NMMJM are expected to move out of the herbaceous riparian vegetation and into upland areas adjacent to the Florida River. The current Project design minimizes disturbance (staging areas only) in the adjacent upland areas where the potential hibernacula are likely to occur.

5.7.2.9 Preliminary Determination of Effect

Based on the timing, duration, implementation of the recommended conservation measures, and design for the proposed Project, WWE determined that the proposed Project is not likely to adversely affect the NMMJM. No other federally listed species has potential to occur in the Project Area. No critical habitat occurs within the Project Area; therefore, the proposed Project would have no effect on critical habitat.

5.8 Institutional Feasibility

Potential Project permitting requirements identified during the development of this Study are summarized in the following sections.

5.8.1 *Federal Permits*

Since Federal Funding is not currently sought for this project and given exemptions to the Clean Water Act for agricultural projects, no federal permitting is required at this time. See section 5.7.1 for a discussion of potential federal permitting requirements.

5.8.2 *Floodplain Development Permit*

WWE reviewed the Preferred Alternative with the La Plata County Floodplain Administrator. The Project is located within a FEMA Zone AE with base flood elevations. In the event the Project generates no rise to the Hydraulic Engineering Center River Analysis System (HEC-RAS) modeled base flood elevations, the FCDC can apply for a repair permit from La Plata County.

In the event the project generates a rise to HEC-RAS modeled base flood elevations, the FCDC can apply for a repair permit under the condition that adjacent permanent structures are not affected by the Project. Based on the HEC-RAS modeling conducted by WWE, the Preferred Alternative generates a rise in base flood elevations immediately downstream of the structure. However, there

are no existing structures between the upstream and downstream extents of the Project limits, and WWE does not foresee issues at this time obtaining a floodplain development permit from La Plata County.

5.8.3 *Construction Dewatering Discharge Permit*

To facilitate construction of the Preferred Alternative, the contractor can utilize the existing Florida Canal Headgate and Canal to temporarily divert water around the existing diversion structure to maintain a dewatered condition downstream for construction. The party responsible for creating a construction dewatering discharge plan and obtaining and complying with the CDPHE Construction Dewatering Discharge Permit is the selected Contractor for the Project. Construction is scheduled to occur during the non-irrigation season when flow in the Florida River is low.

5.8.4 *Construction Stormwater Discharge Permit*

The party responsible for creating a construction stormwater management plan and obtaining and complying with the CDPHE Construction Stormwater Discharge Permit is the selected Contractor for the Project.

6.0 FINANCIAL FEASIBILITY ANALYSIS

6.1 Loan Amount

Numerous funding sources are involved in the financing the estimated Project cost of $1,200,000 (see Table 5). The FCDC is requesting a $1,025,000 CWCB Water Project Loan at a 1.80 percent interest rate for a 30-year term in the event additional grant monies cannot be secured for the Project.

6.2 Financing Sources

Financing sources include share assessments from FCDC shareholders and FWCD revenue for conveyance of Florida Project water. The FCDC will assess the current water users served by the Florida Canal for participation in the Project. The local shares of the Florida Canal will not see an increase in their annual assessment per share beyond a typical inflation rate of 3.22% (see Table 6).

6.3 Revenue and Expenditure Projections

The Schedule of Revenue and Expenditure Projections is shown in Table 6. The loan breakdown is by years of operation. A present worth assessment for year one was provided by FCDC along with a share assessment and operation and maintenance assessments per share.

6.4 Loan Repayment Sources

6.4.1 *Water Users*

Water users in The Project area are considered by the FCDC to be either a shareholder or a Project Water user. A shareholder in the FCDC owns adjudicated water. Some shareholders own both

adjudicated and Project Water. According to the FCDC, there are 6200 shares, 293 shareholders, and the number of shareholders and Project Water consumers are anticipated to remain consistent over the next 30 years as there is limited availability for further development within the Project area. Funds will be generated through a service charge of $70.00 per shareholder and an irrigation assessment of $40.30 per share adjusted annually for inflation (see Table 6).

6.4.2 *Grant Funding*

The FCDC has secured grant funding for Phase II of the project through CWCB. The total grant funds awarded to date include a $125,000 grant from CWCB's CWP Agricultural Projects pool, and $50,000 from the CWP Environmental and Recreational Projects pool (see Table 5). The FCDC is seeking an additional $425,000 in grant funding via a combination of grants from the WSRF Statewide Account ($250,000), Southwestern Basin Roundtable ($25,000), the Southwestern Water Conservation District ($25,000), and working with CWCB staff to identify other grant sources to make up the remaining $125,000.

The Southwestern Basin Round Table approved the WSRF Round Table Resquest for $25,000. The Statewide WSRF request for the $250,000 is before the CWCB Board for the September meeting. The FCDC will prepare an application of the State Water Plan Funding and Southwest Water Conservation District in November of 2020.

6.5 Financial Impacts

The FCDC will assess the current water users served by the Florida Canal for participation in the Project. Water users served by the Project are expected to see an increase in assessment rates consistent with an annual inflation rate of 3.22%. The increase in assessment revenues are sufficient to cover the annual loan payment for the Preferred Alternative.

6.6 TABOR (Taxpayer's Bill of Rights) Issues

According to FCDC personal, the ditch company does not operate under TABOR requirements.

6.7 Collateral

The FCDC offers the Diversion Structure as collateral and will dedicate the FCDC assessment revenues to offset nonpayment. In the event the FCDC is unable to repay the CWCB for the loan amount, the Diversion Structure will transfer ownership to the CWCB. In addition, the CWCB will receive revenue generated from the shareholders of the FCDC to repay the loan.

6.8 Sponsor Creditworthiness

The sponsor creditworthiness information is provided in Appendix C.

6.9 CWCB Water Project Loan Application

The CWCB Application has been completed and signed by the FCDC and is provided in Appendix D.

7.0 CONCLUSION AND RECOMMENDATIONS

It is the FCDC Subcommittee's and WWE's recommendation that Alternative No. 4 be selected as the Preferred Alternative. This recommendation is based upon increased safety, reduced sedimentation and debris buildup, improved fish habitat connectivity, and the ability to maintain a reliable supply of water to the Florida Canal water users.

8.0 REFERENCES CONSULTED

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TABLES

Table 1
Florida Consolidated Ditch Company
WATER RIGHTS TABULATION

FLORIDA CANAL

WATER RIGHTS TRANSACTION INFORMATION

	ADMINISTRATIVE NUMBER	ADJUDICATION DATE	APPROPRIATION DATE	CASE NUMBER	DECREED RATE (CFS)	DECREED VOLUME (AF)	ADJUDICATION TYPE	STATUS	USES	COMMENT
Florida Canal (Class B shares)	14152.00000	11/8/1923	9/29/1888	CA1751	24		O	Absolute	IRR	
	15774.00000	11/8/1923	3/9/1893	CA1751	16		O	Absolute	IRR	
	22428.00000	11/8/1923	5/29/1911	CA1751		970	O	Absolute	IRR	Pastorius Reservoir
Florida Canal Enlargement (Class C shares)	20890.00000	11/8/1923	3/13/1907	B-1751	31		O, CA	Absolute	IRR	Alternate Point of Diversion Taken in the Florida Farmers Ditch
	20890.00000	11/8/1923	3/13/1907	CA1751	40		O	Absolute	IRR	
Total					**80**					

FLORIDA FARMERS DITCH

WATER RIGHTS TRANSACTION INFORMATION

	ADMINISTRATIVE NUMBER	ADJUDICATION DATE	APPROPRIATION DATE	CASE NUMBER	DECREED RATE (CFS)	DECREED VOLUME (AF)	ADJUDICATION TYPE	STATUS	USES	COMMENT
Florida Farmers Ditch (Class A shares)	12392.00000	11/8/1923	12/5/1883	CA1751	12.08		O	Absolute	IRR	
	13649.00000	11/8/1923	5/15/1887	CA1751	1.33		O	Absolute	IRR	
	14016.00000	11/8/1923	5/16/1888	CA1751	8.58		O	Absolute	IRR	
	14291.00000	11/8/1923	2/15/1889	CA1751	23		O	Absolute	IRR	
Florida Coop Ditch (Class D shares)	22228.00000	11/8/1923	11/10/1910	B-1751	4		O, CA	Absolute	IRR	
	22228.00000	11/8/1923	11/10/1910	CA1751	26		O	Absolute	IRR	
FWCD	35219.00000	3/21/1966	6/5/1946	B-1751	110		S	Absolute	IRR	Decreed to provide adjucated water rights from FWCD
Florida Canal Enlargement	20890.00000	11/8/1923	3/13/1907	W0306	31		O	Absolute	IRR	Alternate Point of Diversion from Florida Canal Enlargement.
Total					**216**					

Source: Colorado Division of Water Resources

Notes:

Adjudication Codes: C - conditional, CA - conditional made absolute, O - original, S - supplemental, TT - transfer to

Use Codes: 0 - storage, 1 - irrigation, 2 - municipal, 3 - commercial, 4 - industrial, 5- recreation, 6 - fishery, 7 - fire, 8 - domestic, 9 - stock, A - augmentation, P - power generation, Q - other, W - wildlife.

Table 2

Planning Level Opinion of Probable Cost for Florida Canal Diversion Rehabilitation Project

Alternative No. 2 Repair and Replace In-Kind

Florida Consolidated Ditch Company

Projected Project Costs for Informational Purposes Only

Description	Cost per Unit	Unit	Reference	Quantity (±)	Cost
Planning Level Estimated Final Engineering / Final Permitting / Services During Bidding and Construction					
Engineering Design					$50,000
Reclamation Plan Development					$10,000
Services During Bidding					$12,000
Environmental					$75,000
Engineering Services During Construction					$50,000
Post Construction Reclamation and Monitoring Services					$31,000
Planning Level Estimated Final Engineering / Environmental / Services During Bidding and Construction					$228,000
Planning Level Construction Cost Estimate					
Mobilization / Demobilization					
10% of Permits, Earthwork and Special Construction Costs	$40,000	LS		1	$40,000
Permits					
Stormwater Permit Compliance	$10,000	LS	1	1	$10,000
Dewatering Permit Compliance	$10,000	LS	3	1	$10,000
Earthwork					
Excavation to Bedrock	$15	CY	2	200	$3,000
Earthwork to replace streambed	$10	CY	2	200	$2,000
Reinforced Concrete Buttress Structure	$1,500	CY	2	110	$165,000
Fill Earthwork between Buttress and Existing Structure	$15	CY	2	70	$1,050
Earthwork	$10	CY	2	1600	$16,000
Stream Bank Stabilization / Earthwork	$500	LF	2	50	$25,000
Special Construction					
Waste Gate	$10,000	EA		1	$10,000
Concrete Spill Structure w/ Bar Grate	$1,250	CY		60	$75,000
Extend existing return to river	$3,000	EA	2	1	$3,000
Construction Subtotal					$360,050
30% Contingency					$108,015
Planning Level Construction Cost Estimate Including Contingency					$468,065
Planning Level Estimated Total Construction / Engineering and Environmental Services					$696,065
Planning Level Estimated Total Construction / Engineering and Environmental Services (Rounded)					**$700,000**

[1]Estimated at 2.5% of Earthwork and Concrete Work costs.

[2]Urban Drainage and Flood Control District Bid Tabs

[3]Assumes using Florida Canal in conjunction with a temporary return to river downstream of work area for dewatering

[4]Assume bids open for 1 month @15 hours per week

[5]Assume 3 month construction schedule @15 hours per week

Table 3

Planning Level Opinion of Probable Cost for Florida Canal Diversion Rehabilitation Project

Alternative No. 4 Newbury Riffle and Cross-Vane Structure

Florida Consolidated Ditch Company

Projected Project Costs for Informational Purposes Only

Planning Level Estimated Engineering / Environmental / Services During Bidding and Construction					
Engineering Design					$60,000
Reclamation Plan Development					$10,000
Services During Bidding					$12,000
Environmental					$75,000
Engineering Services During Construction					$80,000
Post Construction Reclamation and Monitoring Services					$31,000
Planning Level Estimated Final Engineering / Environmental / Services During Bidding and Construction					$268,000
Planning Level Construction Cost Estimate					
Description	**Cost per Unit**	**Unit**	**Reference**	**Quantity (±)**	**Cost**
Mobilization / Demobilization					
10% of Permits, Earthwork and Special Construction Costs	$70,000	LS		1	$70,000
Permits					
Stormwater Permit Compliance	$20,000	LS	1	1	$20,000
Dewatering Permit Compliance	$10,000	LS	4	1	$10,000
Earthwork					
Grouted Newbury Riffle Structure	$450	SY	2	300	$135,000
Grouted Cross Vane Structures	$15,000	EA	2	5	$75,000
Scour Hole Fill Material	$50	CY	2	200	$10,000
Earthwork	$10	CY	2	1600	$16,000
Stream Bank Restoration / Stabilization	$500	LF	2	300	$150,000
Special Construction					
Sheet Pile Wall	$70	SQFT	2	600	$42,000
Grouted Rock Anchors	$850	EA	3	100	$85,000
Waste Gate	$10,000	EA		1	$10,000
Concrete Spill Structure w/ Bar Grate	$1,250	CY		60	$75,000
Open Channel Return to River	$1,250	CY	2	10	$13,000
Construction Subtotal					$711,000
30% Contingency					$213,300
Planning Level Construction Cost Estimate Including Contingency					$924,300
Planning Level Estimated Total Construction / Engineering and Environmental Services					$1,192,300
Planning Level Estimated Total Construction / Engineering and Environmental Services (Rounded)					**$1,200,000**

[1]Estimated at 2.5% of Earthwork and Concrete Work costs.

[2]Urban Drainage and Flood Control District Bid Tabs

[3]RS Means 2019: 10' Long 1" Diameter drilled and grouted rock bolts

[4]Assumes using Florida Canal in conjunction with a temporary return to river downstream of work area for dewatering

[5]Estimated at eight design sheets at 10K per sheet.

[6]Assume bids open for 1 month @15 hours per week

[7]Assume 5 month construction schedule @20 hours per week

Table 4
CWCB Loan Feasibility Study
Florida Consolidated Ditch Company
Florida Canal Diversion Structure Rehabilitation Project Anticipated Implementation Schedule[1]

	2020		2021				2022				2023				2024		
Task	July-Sept	Oct - Dec	Jan-Mar	Apr-June	July-Sept	Oct-Dec	Jan-Mar	Apr-June	July-Sept	Oct -Dec	Jan-Mar	Apr-June	July-Sept	Oct -Dec	Jan-Mar	Apr-June	July-Sept
Feasibility Application Due	**August 1st**																
CWCB Board Approval	**September 15th**																
Shareholder Vote		**November**															
Seek Additional Funding																	
Final Engineering Design																	
Contractor Bidding and Selection																	
Project Construction																	
Preparation of Record Drawings; Measurement of Post-Project Benefits and Preparation of Final Report																	
Post Construction Reclamation and Performance Monitoring																	

(1) Timeline is based on completion dates or time period from the Notice to Proceed and Purchase Order Issuance. This schedule may be adjusted based on grant award date, weather delays, or to accommodate obligations for irrigation water delivery.

Table 5
CWCB Loan Feasibility Study
Florida Consolidated Ditch Company
Florida Canal Diversion Structure Rehabilitation Phase 2 Funding Sources and Approach for Preferred Alternative

Description of Services	Engineering, Permitting, and Construction	CWCB					SWCD	Total Grant Funds	Matching Funds	Total Cash Funds	Total Project Cost
		Possible Other Funding Sources	WSRF		Colorado Water Plan						
		CWCB State Water Plan, Fish and Wildlife Resources Fund, and Colorado Watershed Restoration Program [1]	Statewide Account [1]	Southwestern Basin Roundtable [2]	CWP Agricultural Projects [3]	CWP Environmental & Recreational Projects [3]	Southwestern Water Conservation District [4]		CWCB Loan/FCDC Cash[5]		
Phase 2 - Final Design, Environmental, Services During Bidding, Construction, Engineering Services During Construction	$1,200,000	$125,000	$250,000	$25,000	$125,000	$50,000	$25,000	$600,000	$600,000	$1,200,000	$1,200,000
% of total =	100%	10%	21%	2%	10%	4%	2%	50%	50%	100%	100%

Notes:
(1) Currently working with CWCB staff on Phase 2 Funding Package.
(2) Pending Application to SW Basin July of 2020.
(3) Approved by CWCB Board but not under contract pending loan approval, loan application proposed to come before CWCB Board September 2020.
(4) Pending application to Southwestern Water Conservation District November 2020.
(5) Pending loan approval from CWCB September, 2020.

Estimated Total Project Cost of Alternatives Evaluated for Loan Feasibility Study

Loan Feasibility Study Alternatives	Total Project Cost
Newbury Riffle and Cross-Vane Structure (Preferred Alternative No. 4)	$1,200,000
Repair and Replace in Kind (Alternative No. 2)	$700,000
Difference	**$500,000**

Match Requirement Check for Basin and Statewide WSRF Grant Requests

Project Funding Sources	Amount	Percent of Total Project Budget	Basin Account Match Requirements	Statewide Account Match Requirements	Is Match Requirement Met?
FCDC CWCB Loan	$600,000	-	-	-	-
Total Match (including SWBRT WSRF Grant Request) for WSRF Statewide Grant Request	$600,000	50%	25%	10%	**Yes**
Total Project Cost	$25,000	2%	-	10% (cash only)	**Yes**
Total Match (including Loan, SWWCD, SWBRT WSRF Grant Request) for WSRF Statewide Grant Request	$625,000	52%	-	50%	**Yes**
Total Project Cost	$1,200,000	-	-	-	-

Table 6
CWCB Loan Feasibility Study
Florida Consolidated Ditch Company
Schedule of Revenue and Expenditures Projections

Information

Total Project Cost	Other Revenue	Inflation	Interest on Reserves	Shares	O&M Per Share
$ 1,200,000.00	48%	3.22%	3.00%	6,200	$70.00

Financing

Source	Share	Principal	Interest	Years
CWCB loan	100%	$1,025,000	1.8%	30

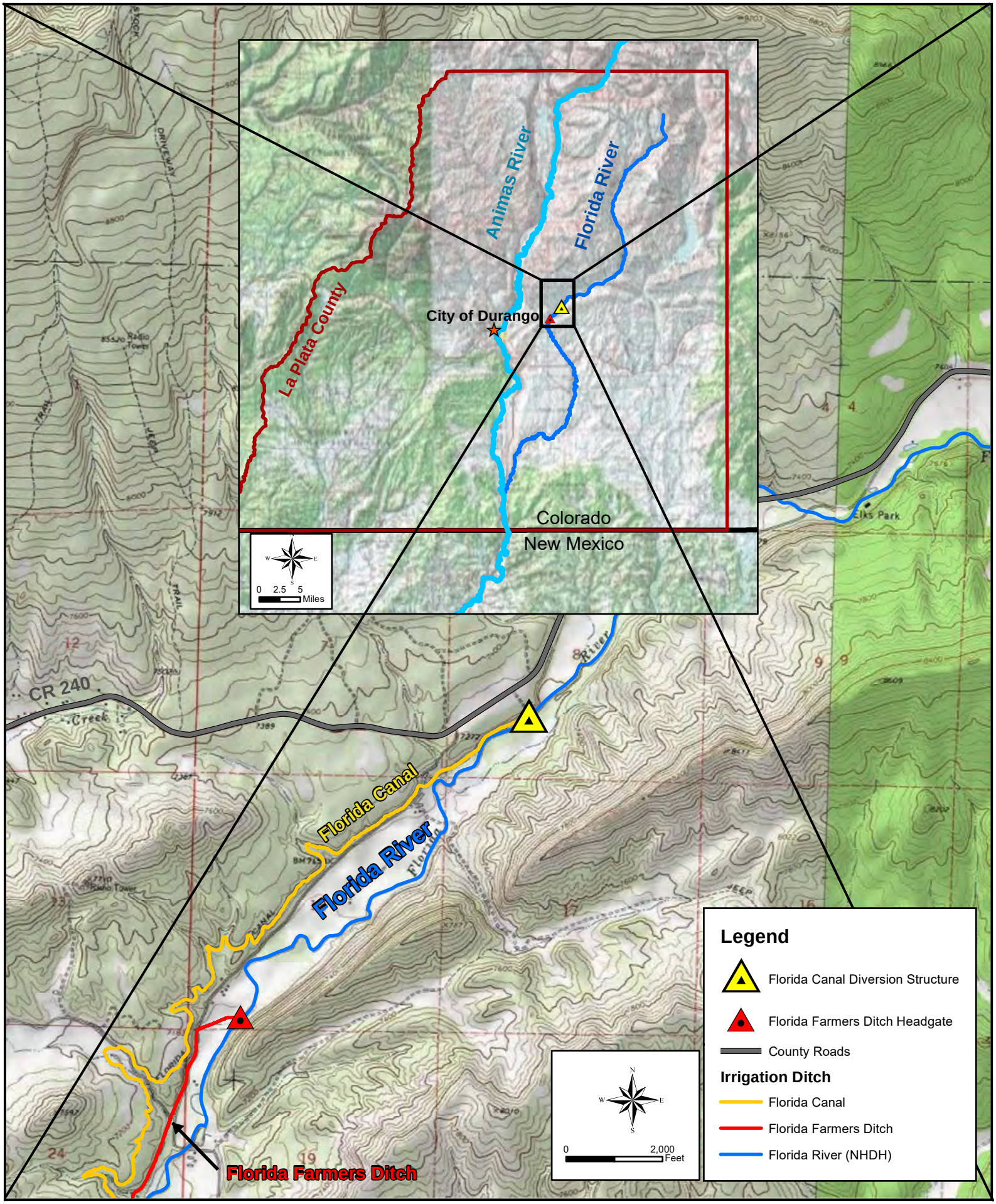
Annual Revenue

Year of Operation	Assessment per Share	Irrigation Assessment	Other Revenue (FWCD)	Total Revenue
1	$40	$249,860	$213,606	$463,466
2	$42	$257,905	$220,484	$478,389
3	$43	$266,210	$227,583	$493,793
4	$44	$274,782	$234,911	$509,693
5	$46	$283,630	$242,475	$526,105
6	$47	$292,763	$250,283	$543,046
7	$49	$302,190	$258,342	$560,532
8	$50	$311,920	$266,661	$578,581
9	$52	$321,964	$275,247	$597,212
10	$54	$332,331	$284,110	$616,442
11	$55	$343,033	$293,259	$636,291
12	$57	$354,078	$302,702	$656,780
13	$59	$365,479	$312,449	$677,928
14	$61	$377,248	$322,510	$699,757
15	$63	$389,395	$332,894	$722,290
16	$65	$401,934	$343,614	$745,547
17	$67	$414,876	$354,678	$769,554
18	$69	$428,235	$366,099	$794,334
19	$71	$442,024	$377,887	$819,911
20	$74	$456,257	$390,055	$846,312
21	$76	$470,949	$402,615	$873,564
22	$78	$486,114	$415,579	$901,692
23	$81	$501,766	$428,960	$930,727
24	$84	$517,923	$442,773	$960,696
25	$86	$534,600	$457,030	$991,631
26	$89	$551,814	$471,747	$1,023,561
27	$92	$569,583	$486,937	$1,056,520
28	$95	$587,923	$502,616	$1,090,540
29	$98	$606,855	$518,800	$1,125,655
30	$101	$626,395	$535,506	$1,161,901
Total		**$12,320,040**	**$10,532,411**	**$22,852,451**

Annual Expenditures

Year of Operation	Operation, Maintenance and Replacement	CWCB Reserve Fund		Payments on CWCB Loan	Interest on Reserve Funds	Total Expenditures
		Annual	Accum.			
1	$37,073	$4,452	$4,452	$44,517	$133.55	$85,908
2	$38,267	$4,452	$8,903	$44,517	$267.10	$86,969
3	$39,499	$4,452	$13,355	$44,517	$400.65	$88,067
4	$40,771	$4,452	$17,807	$44,517	$534.21	$89,206
5	$42,084	$4,452	$22,259	$44,517	$667.76	$90,385
6	$43,439	$4,452	$26,710	$44,517	$801.31	$91,606
7	$44,837	$4,452	$31,162	$44,517	$934.86	$92,872
8	$46,281	$4,452	$35,614	$44,517	$1,068.41	$94,182
9	$47,771	$4,452	$40,065	$44,517	$1,201.96	$95,538
10	$49,310	$4,452	$44,517	$44,517	$1,335.52	$96,943
11	$50,897		$44,517	$44,517	$1,335.52	$94,079
12	$52,536		$44,517	$44,517	$1,335.52	$95,718
13	$54,228		$44,517	$44,517	$1,335.52	$97,410
14	$55,974		$44,517	$44,517	$1,335.52	$99,156
15	$57,777		$44,517	$44,517	$1,335.52	$100,958
16	$59,637		$44,517	$44,517	$1,335.52	$102,819
17	$61,557		$44,517	$44,517	$1,335.52	$104,739
18	$63,539		$44,517	$44,517	$1,335.52	$106,721
19	$65,585		$44,517	$44,517	$1,335.52	$108,767
20	$67,697		$44,517	$44,517	$1,335.52	$110,879
21	$69,877		$44,517	$44,517	$1,335.52	$113,059
22	$72,127		$44,517	$44,517	$1,335.52	$115,309
23	$74,450		$44,517	$44,517	$1,335.52	$117,631
24	$76,847		$44,517	$44,517	$1,335.52	$120,029
25	$79,321		$44,517	$44,517	$1,335.52	$122,503
26	$81,876		$44,517	$44,517	$1,335.52	$125,057
27	$84,512		$44,517	$44,517	$1,335.52	$127,694
28	$87,233		$44,517	$44,517	$1,335.52	$130,415
29	$90,042		$44,517	$44,517	$1,335.52	$133,224
30	$92,941		$44,517	$44,517	$1,335.52	$136,123
Total	**$1,827,987**	**$44,517**		**$1,335,517**	**$34,056**	**$3,173,965**

FIGURES



Document Path: P:\061-110\140 Florida Canal Diversion Dam\05 Mapping\Florida Canal Diversion Structure - Location Map.mxd

WWE
Wright Water Engineers, Inc.
1666 N. Main Ave., Ste.C
Durango, CO 81301
(970) 259-7411 ph 259-8758 fx

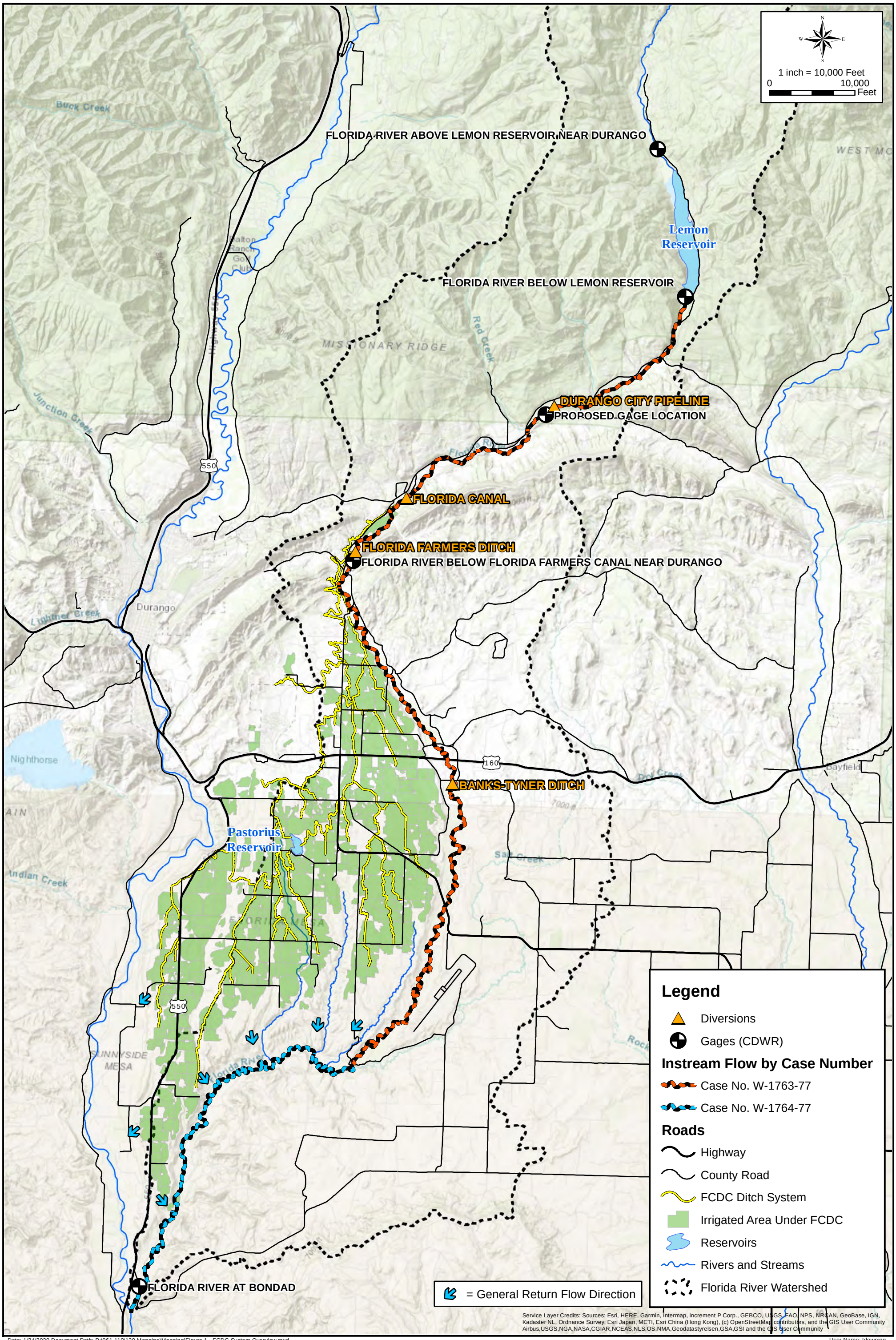
LA PLATA COUNTY, CO

FLORIDA CANAL DIVERSION STRUCTURE - LOCATION MAP

FLORIDA CONSOLIDATED DITCH COMPANY

PROJECT NO. 061-110.140

FIGURE 1



Date: 1/24/2020 Document Path: P:\061-110\120 Mapping\Mapping\Figure 1 - FCDC System Overview.mxd

User Name: tdowning

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1666 N. Main Ave., Ste.C
Durango, CO 81301
(970) 259-7411 ph 259-8758 fx

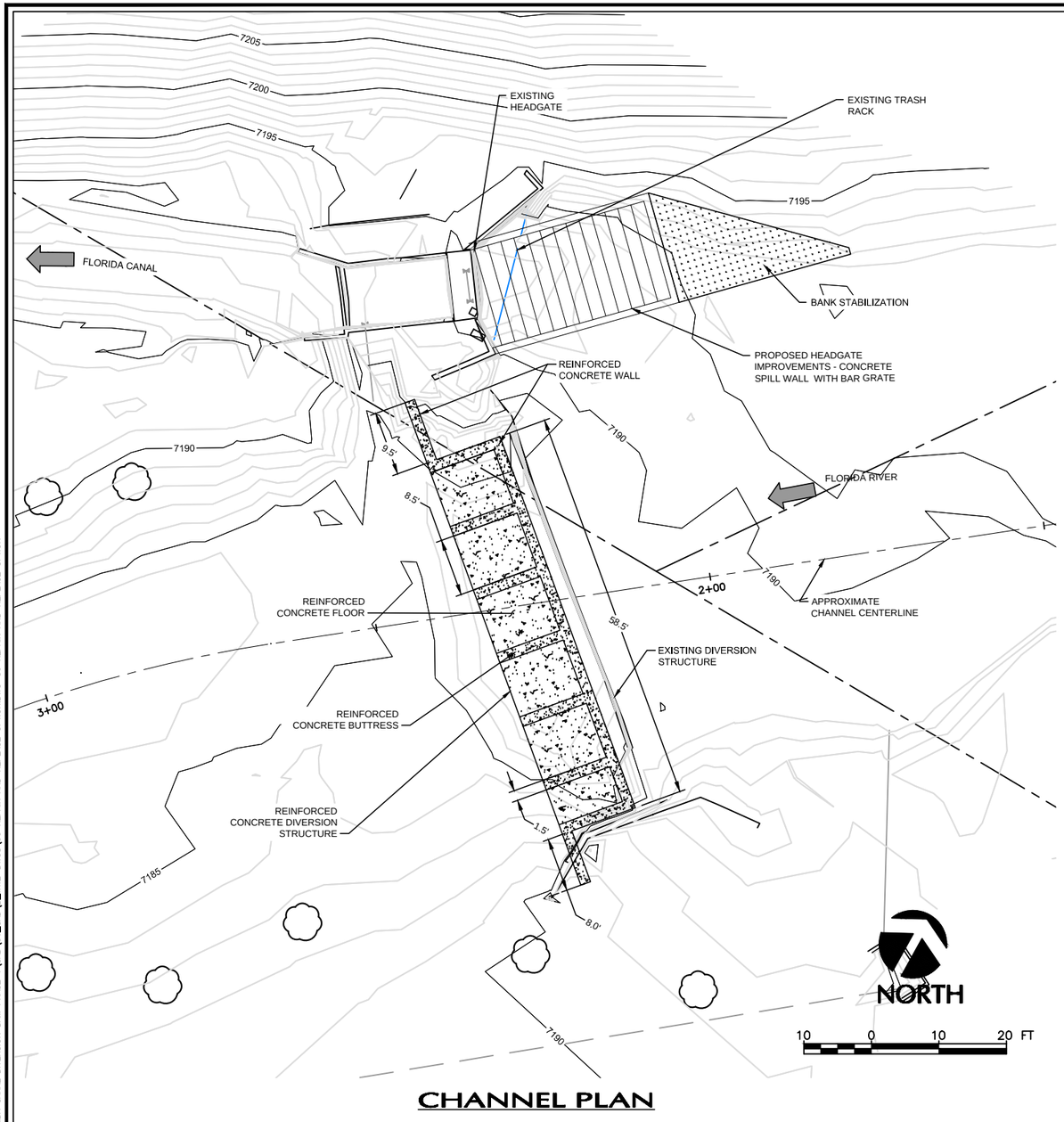
LA PLATA COUNTY, CO

FCDC SYSTEM AND THE FLORIDA BASIN

Florida Consolidated Ditch Company

PROJECT NO. 061-110.120

FIGURE 2

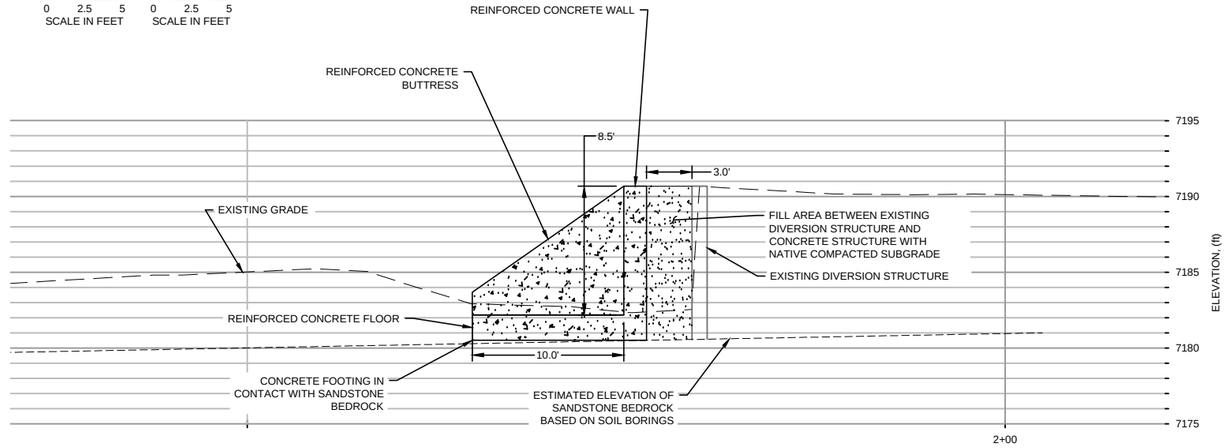


CHANNEL PLAN

PROFILE SCALES

HORIZONTAL: 0 2.5 5 SCALE IN FEET

VERTICAL: 0 2.5 5 SCALE IN FEET



CHANNEL PROFILE

CONCEPTUAL NOT FOR CONSTRUCTION

DRAFT WORK IN PROGRESS

WWE WRIGHT WATER ENGINEERS, INC.
2490 W. 26TH AVE. SUITE 100A
DENVER, CO 80211
(303)480-1700 FAX(303)480-1020

NO.	BY	DATE	DESCRIPTION	COMMENTS
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DETAIL	-	06/29/18
CHECK	-	06/29/18
APPROVAL		
SCALE		SHOWN
06 REPAIR AND REPLACE OPTION.dwg		

FLORIDA CANAL DIVERSION STRUCTURE REHABILITATION PROJECT

ALTERNATIVE NO. 2
REPAIR AND REPLACE IN-KIND

JOB NO. 061-110.141
REVISION NO. —
FIGURE 3

Plot Date/Time: 06/19/2020, 09:35:44 AM; P:\061-110\141 FLORIDA CANAL DIVERSION DAM PHASE 1\CAD\01_CAD\8_WWE-DWGS\06 REPAIR AND REPLACE OPTION.DWG-06 REPAIR AND REPLACE OPTION

ROSS, J MARC

EXISTING FLOW MONITORING STRUCTURE

EXISTING CANAL WASTEWAY

EXISTING HEADGATE

EXISTING TRASH RACK

BANK STABILIZATION

PROPOSED HEADGATE IMPROVEMENTS - CONCRETE SPILL WALL WITH BAR GRATE

FLORIDA CANAL

FLORIDA RIVER

NORTH

20 0 20 40 FT

PROPOSED WASTEWAY GATE

PROPOSED BURIED WASTEWAY 24" PIPE RETURN TO RIVER (EXACT LOCATION TBD)

EXISTING DIVERSION STRUCTURE

CROSS SECTION 3+76

EXISTING BOULDERS TO REMAIN

EXISTING HEADGATE

EXISTING IRRIGATION PIPE

NEWBURY CONSTRUCTED RIFFLE WITH SPACED POOLS

PROPERTY LINE

EXISTING CHANNEL THALWEG

CROSS VANE WITH SPACED POOLS

NATIVE VEGETATION AND STREAM BANK RESTORATION ALL DISTURBED AREAS, TYP.

EXISTING IRRIGATION PIPE EXACT LOCATION UNKNOWN

EXISTING GRADE MAJOR CONTOUR

EXISTING GRADE MINOR CONTOUR

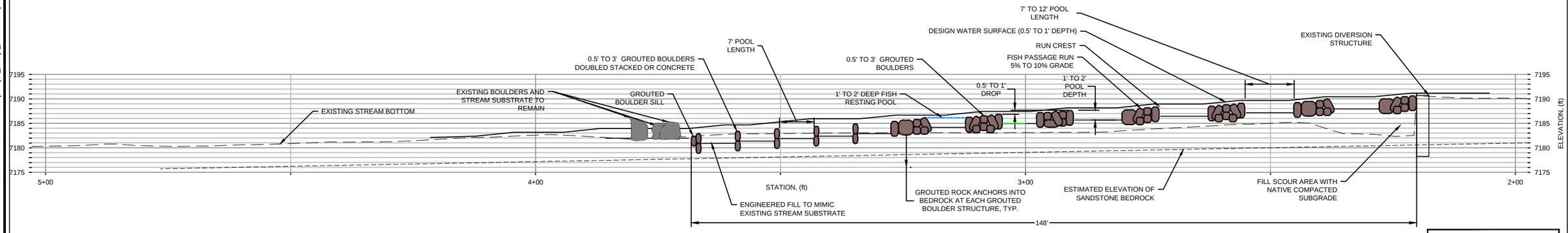
PROPERTY OWNER, TYP

TRIPLE S ODYSSEY, LP

CALL COLORADO 811 OR CALL UTILITY NOTIFICATION CENTER OF COLORADO 1-800-922-1987 CALL 3 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

SIMILAR PROJECT FINISHED PHOTO

CHANNEL PLAN



PROFILE SCALES

HORIZONTAL 0 5 10 SCALE IN FEET

VERTICAL 0 5 10 SCALE IN FEET

CHANNEL PROFILE

CONCEPTS ONLY NOT FOR CONSTRUCTION

DRAFT WORK IN PROGRESS

WWE WRIGHT WATER ENGINEERS, INC.
2490 W. 26TH AVE. SUITE 100A
DENVER, CO 80211
(303)480-1700 FAX(303)480-1020

NO.	BY	DATE	DESCRIPTION	COMMENTS
1	---	---	-	HAL
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		DATE
DESIGN	-	12/14/08
DETAIL	-	12/14/08
CHECK	-	12/14/08
APPROVAL		
SCALE		SHOWN

05 COMBINATION PLAN AND PROFILE - NEWBURY RIFFLE AND CROSS VANE.dwg

FLORIDA CANAL DIVERSION STRUCTURE REHABILITATION PROJECT

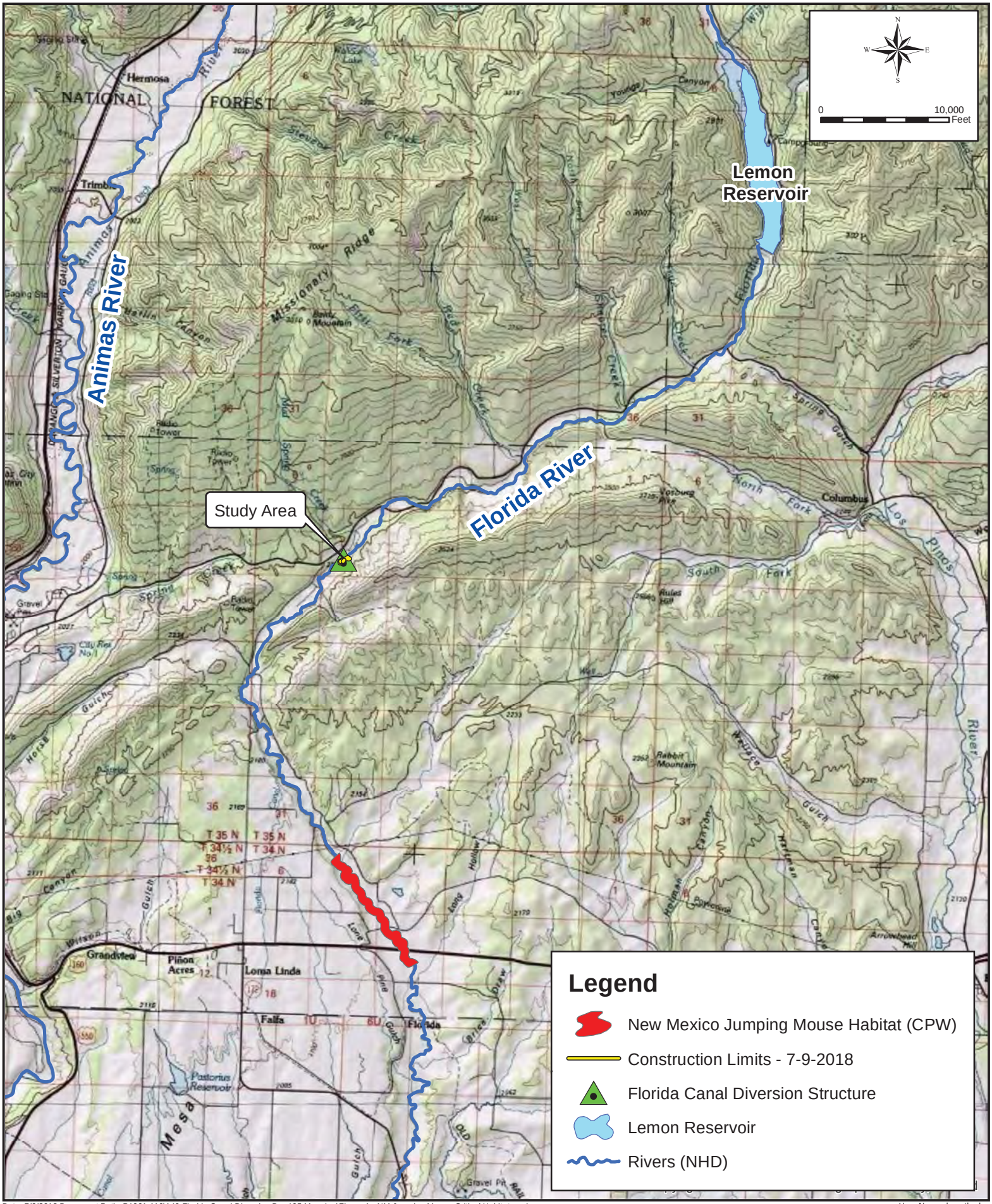
ALTERNATIVE NO. 4 COMBINATION CROSS VANE AND NEWBURY RIFFLE

JOB NO. 061-110.141

REVISION NO. ----

FIGURE 4

Plot Date/Time: 06/19/2020, 09:40:07 AM, P:\061-110\141 FLORIDA CANAL DIVERSION DAM PHASE 1\CAD\01_CAD\B_WWE-DWGS\05 COMBINATION PLAN AND PROFILE - NEWBURY RIFFLE AND CROSS VANE.DWG-FIGURE FOR FEASIBILITY STUDY



Date: 7/9/2018 Document Path: P:\061-110\140 Florida Canal Diversion Dam\05 Mapping\Figure 1 - NM Jumping Mouse Critical Habitat.mxd

User Name: bvonthaden

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LA PLATA COUNTY, COLORADO

NEW MEXICO JUMPING MOUSE CRITICAL HABITAT ON FLORIDA RIVER

FLORIDA CONSOLIDATED DITCH COMPANY

PROJECT NO. 061-110.140

FIGURE 5

APPENDICES

Appendix A

FCDC Formation Documents

Appendix A-1

Articles of Incorporation

CERTIFICATE OF INCORPORATION
OF
THE FLORIDA FARMERS DITCH COMPANY.

State of Colorado, ,
County of La Plata,)ss.

Article-I. Know all men by these presents, that We, L.H.Patterson, S.J.Hood, J.C.Earnest, T.J.McGhee, J.P.Harper, D.S.Griffith, D.T.Griffith, Geo.Connelly and A.P.Camp, all of La Plata County do associate ourselves together as a Company under the name and style of "The Florida Farmers Ditch Company" for the purpose of becoming a body Corporate and politic under and by virtue of the laws of the State of Colorado, and to that end we do hereby make, execute, certify and acknowledge in duplicate this certificate in writing our intention so to become a body corporate under and by virtue of said laws.

Article, II. The corporate name of said company as above stated, shall be "The Florida Farmers Ditch Company".

Article III- The objects for which this said Company is formed are as follows, to wit:-- To acquire by purchase the ditch known as the Florida Mesa Irrigating ditch, situate in La Plata Co., Colorado, and receiving its waters from the Florida River, at a point in the S.W.quarter of the S.W.quarter of Section 18, Tp.35, N.R.8, W.N.M.P.M.-as the same is recorded in book 37, at page 357 of the records of La Plata County, Colorado, and to enlarge, own and operate and maintain the same for the purpose of conveying water there through for irrigation and domestic purposes and specially for use on and to irrigate the following described land, to wit:-

The west half of the N.E.quarter Sec.31,Tp.35,N.R.8 W.N.M P.M. the S.W.quarter and the W.half of S.E.quarter Sec. 31,Tp.35 and N.half of section 6 Tp.34 R.8 W.N.M.P.M.,the E.half of the S.E.quarter Sec.31 Tp.35 R.8 W.N.M.P.M. The S.W.quarter of the N.W.quarter and W.half of S.W.quarter Sec.6,Tp.34 N.R.8 WN.M.P.M.-The S.E.quarter of N.W. quarter -The E.half of S.W.quarter and S.E.quarter of Sec. 5 T.34 R.8 W.N.M.P.M. and the S.E.quarter Sec.6.T.34.N.R.8. W.N.M.P.M.-The W.half Sec.8 and W.half of N.E.quarter and W.half S.E.quarter Sec.8 and N.half of Sec.17 and the N.W. quarter of the N.W.quarter of Sec.16 in T.34 N.R.8 W.N.M.P.M.- The E.half Sec.12 T.34 N.R.9 W.N.M.P.M. and also to irrigate such other lands as may lie under said ditch and can be watered therefrom,and to acquire the right of way for said ditch and to build own and acquire laterals and extensions to said ditch.

Article IV. The capital stock of said Company shall be Eighteen thousand dollars divided into Eighteen hundred shares of the par value of ten dollars each.

Article V. This said Company shall exist twenty years.

Article VI. The number of Directors or Trustees of said Company shall be ~~three~~ four and the affairs of said Company for the first year of its existence shall be managed by T.J.McClure,D.S. Griffith and L.H.Patterson. and George B Connelly

Article VII. The principal office of said Company shall be kept at the City of Durango,in La Plata County,Colorado, and the prin-

cipal business of said Company shall be carried on in La Plata County, Colorado.

Article VIII. The waters for said ditch are to be taken from the Florida River at a point on said stream in the S.W.quarter of the of the S.W.quarter of Sec.18 T.35 N.R.8 W.N.M.P.M. at a point 375 ft. north along the west bank of the Florida River from the intersection of said river bank with the south line of said Sec.18 and the line of said ditch shall run from the said last named point thence west on the south line of said Sec.18-682 ft.to the foot of the bluff 450 ft. east of the S.W.corner of said Sec.18 thence [redacted] along said bluff crossing the east line of Sec.24.T.35.N.R.9.W. N.M.P.M. 1320 ft. south of the N.E.corner of said Sec.24, thence crossing the centre line east and west through said Sec.24-500ft. west of the east quarter corner thence crossing line between Sec.19 and 30.T.35 N.R.8.W.N.M.P.M. 15 ft. east of the N.W.corner of said Sec.30 thence cross line 820 ft.east of west quarter corner of said Sec.30, thence cross south line of Sec.30-400 ft, west of south quarter corner of said Sec.30-thence cross centre line north and south through Sec.31 T.aforesaid 710 ft. more or less south of north quarter corner of said Sec.31, thence 1525 ft. to a point in the S.W.quarter of the N.E.quarter of said Sec,31, the dividing gate of west branch, thence southeastward 677 ft. to a point about 500 ft. east of centre of said Sec. 31, thence southward to south line of said Sec.31 to a point 1284 ft. east of the south quarter corner of said Sec.31 to dividing gate of east and south branches thence for

east branch south eastward to west line of Sec.6.T.34.N.R.8 W.1395 ft.south from N.W.corner of said Sec.5.-from said last dividing gate for south branch, south to centre line east and west to Sec.6.T.34.N.R.8.W.N.M.P.M. 1110 ft.west from the east quarter corner of said Sec.6.to thence through the S.E.quarter of said Sec.6.to the south line thereof 75 ft.west from the S.E.corner of said quarter section,then thence through N.E.corner of N.E.quarter Sec.7.T.aforesaid,to the east line thereof,420 ft.S. of the N.E.corner of said Sec.7. and enter section 8. The west branch beginning at the dividing gate on the S.W.quarter of N.E. quarter of said sec.31.and crossing line into N.W.quarter of said sec.31.-560 ft.north of centre of Sec.and into the S.W. quarter of said sec.31-216 ft.W.of said centre of section to the S.line of said section at a point 660 ft.west of the S.quarter corner of Sec.31. Thence into the N.W.quarter of sec.8 T.34.R.8 W.N.M.P.M. to a point where is placed a dividing gate and whence a branch of said ditch leads to the S.E.quarter of Sec. 6.T.aforesaid,passing into said quarter section at its north west corner thence following north line of said quarter section east about 95 rods and connecting with the south branch of said ditch. From the last dividing gate aforesaid the west branch leads into Sec.1.T.34.N.R.9.W.N.M.P.M.across north line of Sec.one 75 ft.west of the N.E.corner of said sec.one.thence through the east half of said Sec.one to the east half of Sec.12. T.34.N.R.9.W.N.M.P.M.

Article IX. Each stock holder shall have the right to take water from said ditch for the purposes specified in quantities bearing the same ratio to the waters running in said ditch,as the amount of stock held by each stock holder respectively bears to the amount of the capital stock of said Company.

Article X

The Directors shall make such prudential By-Laws for the government of the said Company from time to time as they may deem proper.

Article XI.

Said Company shall not incur any indebtedness by loan in any form unless consent of three fourths of all the stockholders shall be first obtained.

Article XII.

The stock of said Company may be assessed from time to time by the Board of Directors in such sums as shall be deemed necessary to defray the expenses of maintaining, repairing and operating said ditch and to discharge all liabilities of said Company.

H. G. C. Patterson (Seal)

S. J. Hood (Seal)

J. C. Earnest (Seal)

T. J. McClure (Seal)

J. P. Harper (Seal)

D. S. Griffith (Seal)

D. F. Griffith (Seal)

George B. Connelly (Seal)

A. P. Camp (Seal)

State of Colorado } s.s.
La Plata County }

I Joe Prewitt Notary Public in and for said County in the State aforesaid do hereby certify that L H Patterson A P Camp Saml J Hood J C Earnest T J McClure D S Griffeth. D F Griffeth. J P Harper and Geo Connelly. of the County of La Plata and State of Colorado are personally known to me to be the persons whose names are subscribed to the annexed Articles of Incorporation, appeared before me this day in person and each for himself acknowledged that he signed, sealed and delivered the said instrument of writing as his free and voluntary act for the uses and purposes therein set forth.

Given under my hand and Notarial seal this Twenty Nineth day of April — A D 1889

Joe Prewitt
Notary Public

NOTARY PUBLIC

My commission expires April 19 1890

9520

Certificate of Incorporation

of the

Florida Farmers Distr Co

La Plata County

DOMESTIC.

FILED in the office of the Secretary of State, of the State of Colorado, the 7 day of March A.D. 1905 at 2 o'clock P.M. and recorded in Book 28 Page 437.

JAMES RICE,
Secretary of State.

This document has been inspected and properly Entered on the Records of The Flat Tax Department

O K

Date May 23, 1968

By [illegible]

KNOW ALL MEN BY THESE PRESENTS, That we, L. M. Patterson, president, and D. S. Griffith and A. P. Camp and T. J. McClure, directors, of the Florida Farmers Ditch Company, an incorporation duly organized on the 28th, day of April A. D. 1888, under the laws of the State of Colorado, do hereby certify to the following facts:

FIRST. That the capital stock of the said The Florida Farmers Ditch Company is eighteen thousand dollars ($18.000) divided into eighteen hundred shares of ten dollars each.

SECOND. That on the first day of June following the date of incorporation the whole of the capital stock was fully paid.

IN WITNESS WHEREOF, we have hereunto set our hands and attached the seal of the said company this 15th, day of February A. D. 1894.

L. M. Patterson President.

A. P. Camp
D. S. Griffith } Directors.
T. J. McClure

State of Colorado,

County of La Plata, ss.

Sworn to and subscribed before me, Golden Barrett, a notary public in and for said county and state aforesaid this 21st day of February, A. D. 1894

Golden Barrett

Notary Public.

My commission expires April 17th 1897

THE PEOPLES PHONE ... Co.

Certificate of capital stock

Paid up.

DOCKETED

EX'D

of ten dollars each.

SECOND. That on the first day of June following the date of incorporation the whole of the capital stock was fully paid.

IN WITNESS WHEREOF, we have hereunto set our hands and attached the seal of the said company this 15th, day of February A. D. 1894.

[signature] President.

[signature]
[signature] Directors.
[signature]

State of Colorado,

County of La Plata, SS.

Sworn to and subscribed before me, Holden Barrett, a notary public in and for said county and state aforesaid this 15 day of February A. D. 1894

[signature]

Notary Public.

My commission expires 189

KNOW ALL MEN BY THESE PRESENTS, That at meeting of the board of directors of The Florida Farmers Ditch Company, held on the 10th, day of January 1891, at the office of said company in the City of Durango, Colo. (which company is a corporation duly organized under the laws of the State of Colorado) the following resolution was adopted:

RESOLVED that the following be adopted as the seal of the company: THE FLORIDA FARMES DITCH COMPANY, DURANGO, COLO. in an outer circle surrounding the word SEAL in the center.

And we do further certify that the impression of said seal shall be as follows:

In witness whereof we have hereunto set our hands and seals as president and secretary of the said The Florida Farmers Ditch Company, this fifteenth day of February, A. D. 1894.

S. H. Patterson President.

D. S. Griffith Secretary.

State of Colorado,
SS.
County of La Plata,

Subscribed before me, Golden Barrett, a Notary Public in and for said county this 21st, day of February, A. D. 1894.

Golden Barrett
Notary Public.

My commission expires April 17th 1897

16320

FLORIDA FARMERS REALTY COMPANY.

Articles of Seal.

EXD

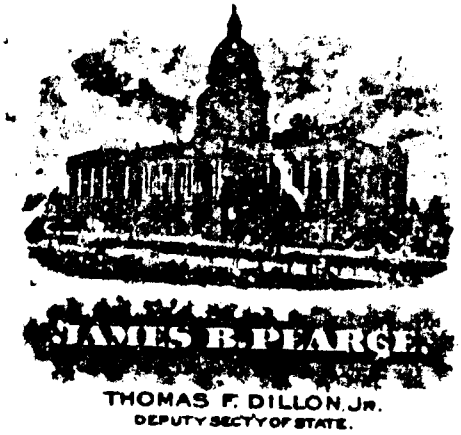
STATE OF COLORADO(ss.
COUNTY OF LA PLATA(

I, John I. Coston, County Assessor, in and for said County do hereby certify, That The Florida Farmers' Ditch Company, is a corporation exclusively for the irrigation of the lands of the individual members of said corporation, and is not seperately assessed for taxation in said La Plata County.

Witness my hand and seal this 2" day of April, 1910.

John P. Coston
County Assessor. (SEAL)

P.S. How shall we get back the money you charged us with last July on this lay of Reese See



STATE OF COLORADO

OFFICE OF SECRETARY OF STATE.

LICENSE TAX DEPARTMENT.

Denver, Colo. 3/25/1910.

Florida Farmers Ditch Co.,

℅ S. E. Reese, Secy.

Durango, Colo.

Dear Sir:-

Replying to your in regard to the Corporation License Tax of this Company, will say, that if you will furnish this office with a certificate from the Assessor of your County, certifying to the fact that you are not assessed for any purpose whatsoever in said County, the proper notation will be made upon our Books and you will be exempt from this tax hereafter.

Yours very truly,

RJH/MEF.

JAMES B. PEARCE,
Secretary of State.
By Thomas D. Kelly Jr.
Deputy.

A. E. REECE
K L RANCH FLORIDA MESA

9/4/867 Renewal 9/14/1909

P. O. Durango, Colorado, Feb, 4 1910

James B Pearce esq
Secretary of State Denver Colo
Dear Sir

Refering to the enclosed bill and to section 5 our ditch is exempt from taxation from the fact that our ditch is owned by Farmers only, and each stockholder uses the water he owns on his own land, we do not carry water for rent, Therefore will you kindly state if we are exempt from the corporation tax

Yours truly
A E Reece Sec

9640

JAMES B. PEARCE,
Secretary of State

THOMAS P. DILLON, JR.
Deputy Secretary of State

STATE OF COLORADO

SECRETARY OF STATE'S OFFICE
CAPITOL BUILDING

NOTICE OF THE ANNUAL STATE CORPORATION LICENSE TAX

The Florida Farms Dist Co.

DENVER, COLO., January 1, 1910.

W. H. C. Pearce

Durango Colo.

The Annual State Corporation License Tax for the year 1910 is due and payable at this office on or before May 1, 1910.

Remittances should be made payable to James B. Pearce, Secretary of State, and should be attached to this notice. In order to avoid the penalties provided by law, same should be in this office not later than May 1, 1910.

The amount of your tax, as by this act provided, is two cents on each One Thousand Dollars of capital stock. See also Penalties, Section 7.

The receipt for this year's tax will not be issued until all such tax and penalties due the State for previous years have been paid.

Postage stamps will not be accepted in payment of this tax.

All communications should be addressed to the Secretary of State, and not to individuals.

Your compliance with the foregoing will facilitate the handling of your business and avoid unnecessary delay.

Respectfully,

JAMES B. PEARCE,
Secretary of State.

(See copy of Act on other side.)

Paid including 1910 — 3 d

ANNUAL STATE CORPORATION LICENSE TAX

An Act in Relation to Public Revenue and Repealing All Previous Acts or Parts of Acts in Conflict Herewith

Be It Enacted by the General Assembly of the State of Colorado:

Section 1. That in addition to all other fees and taxes now provided for by law, every corporation which has heretofore obtained, or which shall hereafter obtain, a charter or certificate of incorporation from this State, shall pay, on or before the first day of May, A. D. 1907, and on or before the first day of May of each year thereafter, an annual State corporation license tax to the Secretary of State of the State of Colorado, as follows: Two cents upon each one thousand dollars of its capital stock.

Section 2. Every foreign corporation which has heretofore obtained, or which shall hereafter obtain, the right and privilege to transact and carry on business within the limits of the State of Colorado, in addition to the fees and taxes now provided for by law, shall pay, on or before the first day of May, A. D. 1907, and on or before the first day of May of each year thereafter, to the Secretary of State of the State of Colorado, an annual State corporation license tax, as follows: Two cents upon each one thousand dollars of its capital stock.

Section 3. Every corporation which shall have failed to pay the tax provided for in sections one and two of this act shall, by reason of such failure be liable to an action of debt, to be commenced by the Attorney-General in the name of The People of the State of Colorado, for the recovery of such tax, and proof of notice of liability for such tax from the Secretary of State, shall not be necessary to the prosecution and maintenance of such suit and recovery of said tax.

Section 4. It shall be the duty of the Secretary of State, immediately upon the passage of this Act, and on or before the first day of February annually hereafter, to notify every corporation liable to tax hereunder of the time when said tax is due, and said notice shall contain a copy of this act.

Section 5. Nothing in this act shall be construed as imposing a license tax upon corporations strictly for educational, social, literary, scientific, religious or charitable purposes, or ditch or irrigation corporations whose property is exempt by law from taxation, or upon charters incorporating Masonic lodges, Odd Fellows lodges, or other fraternal or benevolent societies.

Section 6. The Secretary of State shall, within thirty days after the receipt of any moneys collected by him under the provisions of the foregoing sections, whether paid under protest or not, pay the same into the general treasury of the State, and shall take, at the time of such payment, a receipt or receipts from the State Treasurer, showing upon the face thereof the exact amount of such moneys paid to said Treasurer and on what account and from what source the same was derived. If it shall be determined in any action at law or in equity that any corporation has erroneously paid said tax to the Secretary of State, upon the filing of a certified copy of the judgment or decree, as the case may be, with the Auditor of State, the latter is hereby authorized to draw a warrant upon the State Treasurer for the refund of such tax and the State Treasurer is hereby authorized to pay such warrant. The Auditor of State shall also give notice to the Secretary of State of such refund, so that he may make the proper entries upon his books.

Section 7. Every corporation which shall have failed to pay the tax provided for by this act, shall, by reason of such failure, forfeit its right to do business within the limits of this State until such tax is paid; and every such corporation in default for said tax after the first day of May of each year, shall, in addition to said tax, pay a penalty of ten per cent of said tax for every six months or fractional part of six months during which said tax may be delinquent; but upon paying said tax and penalty such corporation shall forthwith be relieved from the forfeiture of its right to do business within this State by reason of such failure.

Section 8. In addition to the action of debt, heretofore authorized for the recovery of the tax and penalty imposed by this act, and as a further means for the enforcement of the provisions of this act, the Attorney-General may commence an action of quo warranto to suspend the right of any delinquent corporation to carry on business within the limits of this State until such tax is paid.

Section 9. It shall be the duty of the Secretary of State, on or before the first day of July annually, to furnish the Attorney-General with a list of all corporations which have failed or neglected to pay said tax, together with a statement of the amount due, including penalty, if any.

Section 10. For the purpose of the foregoing tax, the fiscal year for basing such tax shall begin with May first of each year and end April thirtieth of the succeeding year.

Section 11. Sections 64, 65, 66, 67, 68 and 69, of Chapter three of the Session Laws of 1902, are hereby repealed; Provided, that the repeal of the aforesaid named sections and the provisions of this act shall not have, in any manner, the effect to release, extinguish, alter, modify or change, in whole or in part, any penalty or liability which shall have accrued under the said sections repealed, and such sections shall be treated and held as still remaining in force for the purpose of sustaining any and all proper actions, suits, proceedings and prosecutions for the enforcement of such penalty or liability, and for the purpose of sustaining any judgment, decree or order which can or may be rendered, entered or made in such actions, suits, proceedings or prosecutions imposing, inflicting or declaring such penalty or liability.

Section 12. Whereas, in the opinion of the General Assembly an emergency exists; therefore, this act shall take effect and be in force from and after its passage.

E. R. HARPER,
President of the Senate.

R. G. BRECKENRIDGE,
Speaker of the House of Representatives.

Approved April 1st, 1907, at 2:45 p. m.
HENRY A. BUCHTEL,
Governor of the State of Colorado.

3/25/1910.

Florida Farmers Ditch Co.,

℅ E. Reese, Secy.

Durango, Colo.

Dear Sir:-

Replying to your in regard to the Corporation License Tax of this Company, will say, that if you will furnish this office with a certificate from the Assessor of your County, certifying to the fact that you are not assessed for any purpose whatsoever in said County, the proper notation will be made upon our Books and you will be exempt from this tax hereafter.

Yours very truly,

HJH/MFF.

STATE OF COLORADO)
(SS.
County of La Plata)

I, Charles Griffith, President, and A. E. Reese, Secretary, of The Florida Farmer's Ditch Company, do each of us hereby certify that the said Charles W. Griffith is now, and has been for a long time heretofore President of said Company, and that the said A. E. Reese is now, and has been for a long time prior hereto, the Secretary of said Company.

That said Company has recently expired by limitation of its charter, and that on the 25th day of August, A.D.1909, at the office of said Company, in the City of Durango, in the County of La Plata, State of Colorado, held a special meeting of its stockholders to determine and vote upon the question of extending and renewing the corporate life of said Company, a notice and call of said meeting was duly published in the Durango Weekly Herald, a newspaper published in the City of Durango, nearest to the place where the principal office of said Company is situate, and nearest the place where the principal operations of the Company are carried on, and was published in said paper for more than four consecutive weeks immediately prior to said meeting and a copy of said notice was duly mailed to each and every

stockholder of said Company, not less than thirty days prior to said meeting, stating the object of said meeting, and the place where the same would be held, and that said notice was signed by a number of stockholders owning at least ten percent. of the entire capital stock of the Company. And that at said meeting a majority of the capital stock as of said Company was represented, either in person or by proxy, and that a vote by ballot was taken upon the question of extending and continuing the corporate life of said corporation for another period of twenty years, and that the result of said ballot was that a majority of the outstanding capital stock of the Company voted in favor of the renewal of said corporation for a period of twenty years, and it was thereupon announced and declared that the said question was duly adopted and carried and that the corporate life of said Company be, and the same was continued and extended for a further and additional period of twenty years as provided by law.

THEREFORE, we do hereby certify that the corporate life of the Florida Farmers' Ditch Company has been continued, extended and renewed for a further period of twenty years from and after the 28th day of August, A.D. 1909.

IN WITNESS WHEREOF, We have hereunto subscribed our names under the seal of said Company, this 28th day of August, A.D. 1909.

Chas. W. Griffith
President, Florida Farmers' Ditch Company.

A. J. E. Reece
Secretary, Florida Farmers' Ditch Company.

-:-:-:-

(19) 50243

The Florida Farmers Ditch Company

Certificate of Renewal

DOMESTIC

FILED IN THE OFFICE OF THE SECRETARY OF STATE, OF THE STATE OF COLORADO, ON

1909 SEP 14 AM 10 32

RECORDED in BOOK 37 PAGE 620
JAMES B. PEAS OF SEC. OF STATE
BY [illegible] DEPUTY
FEES $ [illegible]

This document has been inspected and properly Entered on the Records of The Flat Tax Department.

OK

Date May 23 1968

[illegible] Clerk

Recorded by
Burr
9/22/09
Burr McCloskey

No. 295. AMENDED CERTIFICATE OF INCORPORATION The W. F. Robinson Printing Co., Mfrs. Colorado Legal Blanks, Denver.

CERTIFICATE OF AMENDMENT
OF
ARTICLES OF INCORPORATION
OF

THE Florida Farmers Ditch Company

Know all Men by These Presents

That we, Philip Craig

President and Vincent Jelenick Secretary, of

The Florida Farmers Ditch Company

a corporation duly organized under and by virtue of the laws of the State of Colorado in that case made and provided, do hereby make this our certificate in and in accordance with the said laws of the State of Colorado we make the following statements:

FIRST—That the holders of more than one-third of the capital stock of The Florida Farmers Ditch Company subscribed, issued and credited to the holders thereof, and outstanding as shown by the boooks of the Corporation, did, on the 19th day of January, A. D. 1921, in writing, request the President of the said Corporation to call a meeting of the stockholders for the purpose of considering a certain proposed amendment to the Articles of Incorporation of the said Corporation, setting forth in said written request the substance of said proposed amendment.

SECOND—That at a meeting of the Board of Directors of the said Corporation, called by the President in pursuance of such request, and held at the office of said Corporation, in the City of Fruitdale, County of LaPlata, in the State of Colorado, on the 19th day of January, A. D. 1921, the President presented such request to said Board, and, thereupon, the following resolution was read and adopted:

Resolved that Article six of the Articles of Incorporation of the Company be so amended as to increase the number of Directors of said Company from four to five members

RESOLVED—That a special meeting of the stockholders of this Corporation be and is hereby called to be held at the office of this Corporation, in the City of Durango County of LaPlata, State of Colorado, for the purpose and object of considering a certain proposed amendment to the Articles of Incorporation of The Florida Farmers Ditch Company

in manner and form as follows, to wit:

RESOLVED—That Section ____ of Article Six of the Articles of Incorporation of the said Corporation be amended to read as follows: The number of Directors or Trustees of said Company shall be five, and the affairs of said Company for the first year of its existence shall be managed by

(over)

F. J. McCluer, D. S. Griffith, and L. H. Patterson and George B. Connelly.

RESOLVED—*That due notice of said meeting be given, as required by law, by the Secretary.*

THIRD—*That thirty (30) days' notice of the said special meeting was given to each stockholder by delivering to each personally, or by depositing in the Postoffice a notice, properly addressed, stating the time and object of the meeting, which said notice was signed by the President and Secretary of said Corporation; and that notice of said meeting was duly published ten (10) days prior to said meeting, in the* The Durango Weekly Herald *a newspaper published in said City of* Durango*, being the place in which the principal office of the Corporation is kept, a copy of which published notice clipped from said newspaper is pasted hereto and follows this paragraph.*

FOURTH—*That the said special meeting of the stockholders of the said Corporation, thus duly called, was held at the Corporation's office in the City of* Durango*, County of* La Plata*, and State of Colorado, on the* 26 *day of* February *A. D. 19*21

FIFTH—*That at the said special meeting of the stockholders of the said Corporation, votes representing more than two-thirds of all the stock of the said Corporation, then subscribed and in good faith outstanding, were cast in favor of the adoption of the proposed amendment, and the same was declared duly adopted.*

SIXTH—*That the President and Secretary of the said Corporation were, at said special meeting, duly authorized and directed to make, verify and file such certificate as might be necessary or required by law to carry into effect the change adopted by the Corporation by amendment to its Articles of Incorporation.*

IN WITNESS WHEREOF, We, the President and Secretary of the said Corporation, have hereunto set our hands and seals, this 27th *day of* May *A. D. 19*21*, and have caused the seal of our said Corporation to be affixed hereunto.*

Philip H. Lenz (SEAL)
President

Attest:

Vincent Jelinek (SEAL)
Secretary.

STATE OF COLORADO, }
COUNTY OF La Plata } ss.

Before me ...., a Notary Public in and for said County and State, personally appeared Ohen C. Craig ...., President, and Vincent Jelinek ...., Secretary of The Florida Farmers Ditch Company .... personally known to me to be the persons whose names are subscribed to the foregoing certificate of amendment to the Articles of Incorporation of said Corporation, who each, being first duly sworn, depose and say upon their oaths each for himself and not one for the other, that they are the President and Secretary, respectively, of the said The Florida Farmers Ditch Company .... and that the facts as set forth in said certificate are true to the best of their knowledge and belief, and that they as such President and Secretary, respectively, of the said Corporation, made, signed and executed the said certificate for the uses and purposes therein mentioned.

Philip H. Craig
President.

Vincent Jelinek
Secretary.

Subscribed and sworn to before me this 7th day of June, A. D. 1921

My commission expires November 12, A. D. 1923

Marguerite B. Edwards
Notary Public.

Recorded ... Fowler
Date Aug 8, 1921
Compared by Chas. ...

No. 14202

CERTIFICATE OF AMENDMENT
of
ARTICLES OF INCORPORATION
of
The Florida Farmers Ditch Company

DOMESTIC

Filed in the office of the Secretary of State of the State of Colorado
FILED in the office of the Secretary of State of Colorado on the 8th day of June 1921 at [illegible] o'clock [illegible] M.
Recorded in Book [illegible] at page [illegible]
CARL S. MILLIKEN, Secretary of State.
By [illegible] Deputy.

By ....

CERTIFICATE OF RENEWAL OF THE CERTIFICATE OF INCORPORATION

STATE OF COLORADO,
COUNTY OF La Plate } ss.

To Whom It May Concern:

This is to certify that at the annual adjourned ~~special~~ meeting of the stockholders of The Florida Farmers Ditch Company held at Durango on the ~~Fifth~~ 26th day of January, A. D. 1928, duly called by the stockholders representing at least ten per cent (10%) of the entire capital stock of the company, the call being published for four weeks in the Durango Herald Democrat, a newspaper published at Durango, State of Colorado, and notice of said meeting having been mailed to each stockholder thirty (30) days prior to this date, there being represented at such meeting 1000 shares of the capital stock of said company out of a total of 1800 shares outstanding.

That at said meeting a resolution was passed to have extended the corporate existence of this said company for a period of twenty (20) years, from and after the date of the expiration of its corporate life, the same being the Fourth day of May, A. D. 1929, the resolution receiving a majority vote of all the outstanding stock of the company. The president and secretary were authorized to certify this resolution under the corporate seal of the company, to send such certificate to the Secretary of State of the State of Colorado, to file duplicate certificates under seal of the company in the office of the recorder of Deeds of the Clerk county of La Plata, State of Colorado, and in pursuance of such resolution, we do hereby certify the same under the seal of the company.

Chas W. Griffith
Vice President

Attest:

(Corporate Seal)

Frank Kruse
Secretary

89450

No.

CERTIFICATE OF RENEWAL

OF THE

CERTIFICATE OF INCORPORATION

OF

The Florida Farmers Ditch Company

DOMESTIC

RECORDED

BOOK 302 PAGE 111

FILED in the office of the Secretary of State, of the State of Colorado, on the 7 day of March A.D. 1929, at 1:00 o'clock P.M.

CHAS. M. ARMSTRONG, Secretary of State

By [illegible] Deputy

Filing Fee $5.00 Paid

Indexed by

112

20-90-17

This document has been inspected and properly entered on the records of The Flat Tax Department.

Date Mar 9 1929

M E White Clerk

OK
EC

This document has been inspected and properly Entered on the Records of The Flat Tax Department.

OK

Date Jan 23, 1968

[illegible] Clerk

No. 150. CERTIFICATE OF RENEWAL OF THE CERTIFICATE OF INCORPORATION.

To Whom It May Concern:

This is to certify that a special meeting of the stockholders of Florida Farmers Ditch Co

Colorado corporation, was held at Kiowa Colo on the 25th day of April, A. D. 1949, such meeting having been called by the stockholders representing at least 10 per cent (10%) of the entire capital stock of the company outstanding. Notice of such meeting as provided by law, was published for two successive weeks prior to the date fixed for said meeting in a newspaper printed at Kiowa, State of Colorado, and notice of said meeting was delivered personally or mailed to each stockholder at least thirty (30) days prior to the date of such meeting, there being represented at such meeting 1180 shares of the capital stock of said company out of a total of 1800 shares outstanding. At said meeting a resolution was passed to extend the corporate existence of the said corporation* In Perpetuity, from and after the date of the expiration of its corporate life,† the resolution received a MAJORITY vote of all the outstanding stock of the corporation. The president and secretary were authorized and directed to file under the corporate seal of the company, a certificate of renewal with the Secretary of State of the State of Colorado, and to file a duplicate certificate in the office of the Recorder of Deeds in each county wherein the company may do business in the State of Colorado.

B J Griffith
President.

(Corporate Seal)

Lloyd B. Wilson
Secretary.

*Corporate existence may be renewed perpetually or for any specified number of years.
†This certificate or renewal shall be filed before or within one year after the expiration of the charter.
Fee for filing certificate of renewal is $25.00 for $50,000 or less and twenty cents for each additional or fractional part of one thousand dollars of authorized capital stock.

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CERTIFICATE OF RENEWAL

OF THE

CERTIFICATE OF INCORPORATION

OF

FLORIDA FARMERS DITCH COMPANY

DOMESTIC

RECORDED

BOOK 557 PAGE 1

FILED in the office of the Secretary of State, of the State of Colorado, on the 25th day of MAY A.D. 1949, at 1:15 o'clock P.M.
GEORGE J. BAKER,
Secretary of State
Filing Clerk .... Fees ....
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This document has been inspected and properly Entered on the Records of The Flat Tax Department.
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Date 26 May 1949
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Date May 23, 1968
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Appendix A-2

FCDC By-Laws

BY-LAWS
OF
THE FLORIDA CONSOLIDATED DITCH COMPANY

ARTICLE I. NAME

The name of this Company shall be as stated in the Articles of Incorporation: "The Florida Consolidated Ditch Company".

ARTICLE II. OFFICES AND OBJECTS

Section 1. The registered office and mailing address of the Florida Consolidated Ditch Company shall be in La Plata County, Colorado. The registered office and mailing address need not be identical, and may be changed at any time by the Board of Directors.

Section 2. The objects of this Company shall be to maintain a ditch system for the carriage of water to shareholders.

ARTICLE III. THE BOARD OF DIRECTORS AND THEIR MEETINGS

Section 1. All corporate powers shall be exercised by or under the authority of a Board of Seven (7) Directors who are Shareholders, elected from their number by the shareholders at the annual meetings, and who serve staggered terms of three (3) years. In order to stagger Director terms, commencing with the November 2013 annual meeting, their terms will be assigned by total number of votes received. The largest vote recipients will be assigned the longest terms available. Three (3) Directors shall be elected for a three (3) year term, two (2) Directors shall be elected for a two (2) year term, and two (2) Directors shall be elected for a one (1) year term. Upon expiration of said staggered terms, all succeeding Directors shall be elected for three (3) year terms. In the event that a share is held by an entity, the entity can designate an authorized agent to be eligible for a term of office as a Director.

Section 2. The Board of Directors shall have the power and authority to manage the business of the Company, delegate duties, appoint agents and employees, and transact all business by and on behalf of the Company in the manner as they shall provide by resolution adopted at a properly called meeting of the Board of Directors not inconsistent with these By-laws and the laws of the State of Colorado. They shall appoint and remove all officers, agents and employees of the Company, prescribe their duties, set their compensation, and require, when deemed advisable, security for their faithful services. They shall generally possess all the powers and perform all the duties usually exercised by or imposed upon Directors of similar corporations.

Section 3. The Board of Directors, at the first meeting after their election, shall elect from among their number a President, a Vice-President and a Secretary/Treasurer for terms of one (1) year.

Section 4. Meetings of the Board of Directors shall be held in La Plata County, Colorado.

Section 5. Meetings of the Board of Directors shall be called by the President when he shall deem necessary, or upon the request of three (3) or more Directors. Timely notice of the time and place of each meeting must be given to each Director personally. Notice of the time and place of meeting shall be made in writing and shall be delivered not less than two (2) or more than fifty (50)

days before the date of the meeting, either personally or by mail or electronic mail (e-mail) to each Board Member entitled to vote at such meeting. If mailed, such notice shall be deemed to be delivered two (2) calendar days after being deposited in the United States mail, addressed to the Board Member at their address as it appears on the books of the Company, with postage thereon prepaid.

Section 6. A majority of the Directors shall constitute a quorum for the transaction of business. If less than a quorum exists, the Directors may adjourn and reschedule the meeting for a later date.

Section 7. In case of a vacancy in the Board of Directors before the expiration of the term, the remaining Board shall elect a qualified person to hold the office for the remainder of the term. The Board of Directors has the right to remove any officer or agent at a properly convened Board of Directors meeting as deemed necessary.

Section 8. In the event that a Director is absent from four (4) or more Board of Directors meetings within a year, and these absences are unexcused in the discretion of the President, the other Directors may elect to replace the Director with an interim replacement who will serve until the next annual meeting of the shareholders, at which time, the shareholders shall elect a permanent replacement Director to serve out the remainder of the replaced Director's term.

ARTICLE IV. OFFICERS

Section 1. The officers of the Company shall be a President, a Vice-President and a Secretary/Treasurer.

Section 2. Assistant officers may be from time to time appointed or employed by the Board of Directors as the needs of the Company may require, and said assistants, when acting in an official capacity, shall have all of the rights, duties, responsibilities and powers of such officer.

Section 3. All subordinate officers and assistants shall answer directly to the Board of Directors and shall serve as requested by the Board until removed or replaced.

Section 4. The President shall be the Chief Executive Officer of the Company; he shall sign all official papers and documents of the Company, preside at all meetings of the Board, and attend to such other duties as the Board of Directors may authorize.

Section 5. In the absence or inability of the President to discharge the duties of the office, the Vice-President shall act in his/her place, holding and exercising all the powers of the President.

Section 6. The Secretary/Treasurer shall keep the minutes of the meetings of the Board of Directors and of the Company; shall keep the stock book and corporate seal, and shall attest by signature and seal of the Company all official documents and certificates of stock. The Treasurer shall publish as required by law these By-laws and notice of all meetings of the shareholders, and shall provide timely notice of meetings to the Board of Directors. The Treasurer shall have charge of all books connected with the issue, transfer and surrender of the stock certificates of the Company, and shall cause all surrendered certificates to be cancelled before issuing new ones, preserving the cancelled certificates. The Treasurer shall maintain a list of shareholders, with their addresses, and shall prepare and certify this list for use at the annual meeting. The Treasurer shall attend to all correspondence and perform all the duties incident to the Office of Secretary, and to such other business of the Company as assigned or required by the Board of Directors. The Secretary/Treasurer shall be the custodian of and receive all funds, credits and securities of the

Company and shall deposit all moneys in the accounts of the Company and disburse the same in accordance with the rules, regulations, and resolutions of the Company. The Treasurer shall keep a complete record of all financial transactions of the Company and render a statement of the condition of finances of the Company to the shareholders at each annual meeting, or as required by the Board of Directors.

ARTICLE V. SHAREHOLDER MEETINGS

Section 1. The annual meeting of the shareholders of this Company shall be held in La Plata County, Colorado, at a date and time deemed practical by the Board of Directors.

Section 2. Special meetings of the shareholders of the Company may be called by resolution at any meeting of the Board of Directors, by written request of the shareholders representing one-third (1/3) of all the shares outstanding, or by a majority of the elected Directors. Notice of such meetings, stating the purpose or purposes for which called, shall be served personally or by mail, or email, not less than ten (10) days before the date set for such meeting. No business shall be acted upon at any special meeting of the shareholders except as specified in the call for the special meeting.

Section 3. Public Notice of the date and time of the annual meeting shall be given by publication in a local newspaper not less than ten (10) days before the annual meeting, and by personal mailing to each shareholder of record not less than fifteen (15) days before the meeting.

Section 4. Shareholders may attend a meeting in person or by proxy. To be valid, a proxy must be in writing, dated, signed by the shareholder, and must designate a person who will be present at the meeting to cast votes for the shareholder. Proxies from a legal entity shall be subscribed by an authorized agent thereof, and proof of such authority must accompany the proxy or be on record with the Company from Company records or other official documents acceptable to the Board. Proxy authority is presumed to be valid for a period of one (1) year unless a different duration is stated on the face of the proxy. Any revocation of a proxy must be in writing, signed, dated and delivered to the Secretary of the Company. The revocation is not valid until received by the Secretary, and will affect only votes cast after the time of receipt by the Secretary.

Section 5. The presence in person or by proxy, of shareholders entitled to vote a majority of the outstanding shares of stock of the corporation, shall constitute a quorum for the transaction of business. If a majority of stock is not represented, the shareholders present may adjourn and set a new date for a subsequent meeting, and the Secretary shall give at least ten (10) day notice in writing to each shareholder not present either in person or by proxy at such meeting

Section 6. Shareholders are entitled to as many votes as shares of stock standing in their name on the books of the Company at all meetings. At all meetings of the shareholders, all questions not specifically regulated by statute, shall be determined by a majority vote of the shareholders present in person or by proxy.

Section 7. At each annual meeting, the shareholders shall approve the annual budget for the upcoming fiscal year, shall elect Directors to serve as subsequent Directors when staggered terms expire, and transact any other business that may come before the shareholders.

Section 8. Any shareholder has the right to appoint, by power of attorney, an authorized stockholder's representative in compliance with Colorado law, to represent them in all matters concerning the Company.

ARTICLE VI. ELECTIONS

Section 1. Each Shareholder shall have the right to nominate a Director or Directors. The President shall then appoint two (2) or more tellers to take and canvass the vote. The election shall be by ballot, on which each person voting shall write the names of the Directors up for election. Each stockholder shall have the right to vote in person or by proxy one (1) vote for each share of stock owned. The person or persons having the highest number of votes in consecutive order shall be declared elected to the Board of Directors for the then succeeding term. All voting shall be non-cumulative.

ARTICLE VII. SHARES OF STOCK

Section 1. Each share of the capital stock of The Florida Consolidated Ditch Company shall entitle the owner to receive from the ditches and canals of said Company, water at the rate of one (1) cubic foot of water per second of time for each forty (40) shares, or a pro rata share in times of shortage.

Section 2. Ownership of capital stock of The Florida Consolidated Ditch Company is subject to these By-laws and the rules and regulations of the Company. The stock certificates shall be numbered and registered in the order in which they are issued. They shall be issued in consecutive order, and a current record thereof shall be maintained, including the name of the person owning the shares and the date of issue. Such certificates shall exhibit the shareholder's name, and shall be signed by the President, countersigned by the Secretary, and sealed with the seal of the corporation.

Section 3: Classes of Stock. There shall be four (4) classes of shares

"A" shares will be issued to former shareholders of the Florida Farmers Ditch Company, and shall be assigned the following water priorities:

- Priority F-17 12.08 c.f.s.
- Priority F-21 1.333 c.f.s
- Priority F-22.5 8.58 c.f.s.
- Priority F-24 23 c.f.s

"B" shares will be issued to former shareholders of the Florida Canal Company, and shall be assigned the following water priorities:

- Priority F-23 24 c.f.s
- Priority F-29 16 c.f.s

"C" shares will be issued to former shareholders of the Florida Canal Enlargement Company, and shall be assigned the following water priorities:

- Priority F-68 40 c.f.s

"D" shares will be issued to former shareholders of the Florida Cooperative Ditch Company, and shall be assigned the following water priorities:

- Priority F-84 30 c.f.s

Section 4. No certificate will be issued for less than one (1) share of The Florida Consolidated Ditch Company. All certificates representing less than one-eighth (1/8) C.F.S. shall be issued in conjunction with a water delivery agreement.

Section 5. The stock and transfer and certificate books shall, in the absence of any special rules or regulations, be kept in the usual manner; bound in books with a stub containing the number of each certificate, its date of issue, and the number of shares represented.

Section 6. All transfers of shares must be made on the books of the Company, subject to the rules and regulations of the Company relating to transfers, and no shares of stock shall be assigned or transferred while the assignor is indebted to the Company.

Section7. Certificates representing any shares to be transferred must be surrendered for cancellation before a new certificate will be issued. No certificate shall be issued in place of one stated to be lost or otherwise unavailable unless the claimant shall follow the procedures set forth in the Rules and Regulations of the Company.

ARTICLE VIII. THE DITCH RIDER

Section 1. The Board of Directors may appoint a Ditch Rider or other authorized representative to act as Superintendent of the ditches and canals of the Company, subject to the direction of the Board of Directors.

Section 2. It shall be the duty of the Company's authorized representative or Ditch Rider to care for and properly maintain the ditches and canals of the Company and to keep the same in repair. The Ditch Rider shall release the amount of water to each shareholder as entitled.

Section 3. No person, other than the authorized representative or Ditch Rider, shall have the right to open or close any headgate, waste gate, division box, or other measuring device, and all such equipment is under the sole control of the Ditch Rider, in accordance with Colorado Water Law.

ARTICLE IX. DIVISION AND ALLOTTMENT OF WATER

Section 1. Each Shareholder in the Company shall be entitled to receive an allotment of water represented by their stock certificate in the amount of one (1) cubic foot of water per second of time for each forty (40) shares of stock owned, subject to the delivery requirements of the Rules and Regulations. The priorities of the shareholders within each class using water from the Company's canal shall be equal.

Section 2. Water shall be furnished continuously as available during the irrigating season, beginning no earlier than May 1, to irrigate or cultivate the land. Other uses of water incidental to irrigation may be permitted by the rules or regulations of the Company.

Section 3. If by reason of any cause, the supply of water shall be insufficient to furnish an amount equal to one (1) C.F.S. per forty (40) shares, then such water as may flow shall be distributed *pro rata* to the shareholders. The Board of Directors may establish and enforce such rules and regulations as they may deem necessary or expedient to distribute the water fairly.

Section 4. Should any Shareholder fail to pay the annual assessment on or before the **fifteenth (15) day of February** in any year, the Shareholder shall not be entitled to water, and the same shall be shut off and kept shut off until the sum so due for any year shall have been paid. The unpaid portion of the assessment shall accrue interest at the rate of one percent (1%) per month until paid in full. The Directors may establish and enforce such other Rules and Regulations, and provide

and declare such other penalties and forfeitures, as they may deem necessary or expedient for the purposes of enforcing and collecting delinquent payments.

Section 5. Any Shareholder transferring or in any way parting with his/her shares of stock shall cease to be entitled to water and no person claiming to own shares of stock shall be entitled to water until such shares are transferred to him on the books of the Company, and water shall have been allotted to the Shareholder as hereinbefore provided.

Section 6. Upon the failure of any Shareholder to pay any assessments when due, the Board of Directors may, in compliance with in the Rules and Regulations of the Company, offer the shares of stock standing in the name of such Shareholder for sale.

ARTICLE X. THE BY-LAWS

Section 1. Each shareholder is entitled to receive a copy of the current By-laws upon receipt of a new certificate or by request.

Section 2. These By-laws may be altered, amended or repealed, in whole or in part, by the shareholders at any duly called meeting provided a written statement of the proposed changes and a copy thereof is sent by the Secretary to each shareholder by mail, at least thirty (30) days before the meeting at which such change is to be voted upon. The proposed change shall be adopted by the vote of two-thirds (2/3) of the stock present or represented by proxy constituting a quorum which vote shall be taken and recorded by yeas and nays.

Section 3. These By-laws shall take effect and be in force immediately after their adoption.

ARTICLE XI. CHANGES OF WATER RIGHTS

Section 1. No application for approval of a change of water right or plan for augmentation may be made to the District Court for Water Division No. 7, State of Colorado ("Water Court"), unless the same has been approved by the Company.

Section 2. The Company shall evaluate the application for change of water rights within a reasonable amount of time. In evaluating whether the requested change of water rights can be made without injury to the Company and its shareholders, the Company may require the applicant to obtain an engineering and legal analysis of the requested change by the applicant and the terms and conditions offered by the applicant. The Company may also engage its engineers and attorney to review the application and engineering and legal analysis submitted by Applicant.

Section 3. An Applicant requesting a change of water right must reimburse the Company for the Company's reasonable costs and fees, including a charge for time spent by the directors and Company employees, engineers and attorneys in analyzing the application to the Company and in any judicial litigation that follows. This specifically includes a challenge to the Company's denial of an application. Prior to analyzing the proposed change, the Company shall obtain an estimate of the costs. The Company shall make said estimate of cost within thirty (30) days of submission of an application and the Applicant shall have thirty (30) days after receipt of the estimate from the Company to make a deposit of the estimated costs. The Company shall not take final action on any application until, and unless, the applicant makes said deposit. If the estimate and deposit needs to be adjusted by further payment or reimbursement, said adjustment shall be made upon the completion of the analysis. In no event shall the Company be required to finally approve or disapprove the application until all fees incurred by the Company are reimbursed.

Section 4. If any portion of this Article XI is declared void by a court of law, the remaining portions of this by-law shall remain in full force and unaffected.

ARTICLE XII. MISCELLANEOUS

Section 1. INDEMNIFICATION: The Company may indemnify an Officer or Director when permitted by law.

Section 2. EMERGENCIES: In the event of an emergency, or situation requiring the Board action before proper notice could be given and a quorum obtained at any convenient meeting place, the President or Secretary may obtain a telephonic vote as follows;

(1) As many Board members as are available anywhere by phone shall be called and given the facts on the nature of the issue, the action desired or required and report any comments and votes by Directors with whom the President or given Secretary has already spoken.

(2) The majority vote of those reached by phone, within such reasonable time as circumstances permit shall control.

(3) Within forty-eight (48) hours after action was taken the initiating officer shall prepare a written report of the circumstances requiring such action, detailing contact of or inability to contact each Director and the reasons for inability to contact, and a summary of the action taken including the breakdown of the vote. Such report shall be mailed to all Directors, placed in the Company records and made available to any shareholder upon reasonable request.

(4) Unavailable Directors shall subsequently review the written report and endorse thereon his or her vote, noting the date of such endorsement no later than thirty (30) days after the events requiring emergency action unless such Director is not available or capable in which case no later than ten (10) days after availability or capability occurs.

Section 3. UNANIMOUS WRITTEN CONSENT: When an emergency does not exist, but meeting would be difficult and not necessary, a written resolution may be subscribed by all of the Directors unanimously approving action to be taken by the Board.

Section 4. LEGAL EXPENSES: Any shareholder who brings an unsuccessful judicial action against the Company shall be responsible for the Company's reasonable attorneys' fees and cost in defending said action. Unsuccessful is intended to mean that the shareholder did not substantially prevail in his, her or its action against the Company.

Section 5. RULES AND REGULATIONS The Board of Directors may at any time adopt additional and further rules and regulations not inconsistent with these By-laws to further address the operations and policies of the Company.

THE FOREGOING BY-LAWS WERE ENACTED AT A DULY CALLED AND CONDUCTED ANNUAL MEETING OF THE SHAREHOLDERS OF THE FLORIDA CONSOLIDATED DITCH COMPANY OF THE _____ DAY OF _____, 2013.

Signed by Board of Directors:

_____

_____

_____

_____

_____

_____

_____

I, the undersigned, Secretary of The Florida Consolidated Ditch Company, a Colorado Corporation, do hereby certify that the foregoing is a true and complete copy of the By-laws of said corporation, including all amendments to date, as the same were adopted by the Shareholders of said corporation on _____, 2013.

IN WITNESS WHEREOF, I have affixed the seal of The Florida Consolidated Ditch Company and subscribed my name on the _____ day of _____, 2013.

Signed by: _____
Secretary

Appendix B

Florida Canal Diversion Preliminary Basis of Design Report

Florida Canal Diversion Structure Rehabilitation
Basis of Design Report

Prepared for:

Florida Consolidated Ditch Company
P.O. Box 2138,
Durango, CO 81301

Wright Water Engineers, Inc.

January 2019

061-110.141

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TABLES

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– BASIS OF DESIGN REPORT –
FLORIDA CANAL DIVERSION STRUCTURE REHABILITATION

1.0 INTRODUCTION AND PROJECT OBJECTIVES

The Florida Canal Diversion Structure (Diversion Structure), constructed in or around 1975, is an existing concrete, steel and wood structure located on the Florida River in La Plata County, Colorado, approximately 6.5 miles northeast of the Town of Durango (see Figure 1). The Diversion Structure serves as an instream check structure to provide the Florida Canal headgate with pre-Compact water rights which is used to irrigate approximately 6,900 acres of land on the Florida Mesa and provide water to Pastorius Reservoir which is a State Wildlife Area. Streamflow in the Florida River is regulated by Lemon Dam, approximately nine river miles upstream from the Diversion Structure. The CWCB holds two instream flow (ISF) water rights on the Florida River that extend from below Lemon Dam downstream to the Confluence with the Animas River.

Phase 1 of the Florida Canal Diversion Structure rehabilitation project (the Project) was funded via a series of grants from the Colorado Water Conservation Board (CWCB), the Southwestern Water Conservation District (SWCD), and matching funds from the Nature Conservancy (TNC), Florida Water Conservancy District (FWCD) and the Florida Consolidated Ditch Company (FCDC). For the Project to be eligible for these grant and matching funds, the following considerations and objectives are considered to be critical components of the Diversion Structure rehabilitation design:

- Rehabilitate the Diversion Structure to provide the ability to consistently divert and convey pre-Compact water rights by the Florida Canal on the Florida River.
- Maintain water rights diversion for adjacent landowner whose headgate is immediately upstream of the existing Diversion Structure.
- Improve the condition and natural function of the Florida River to promote self-sustaining fisheries, and to support native species and functional habitat in the long term.
- The rehabilitation should allow for a safer structure than the existing low head dam.

The primary project stakeholders associated with the project include the following:

- FCDC (operator of the Diversion Structure and Florida Canal),
- Colorado Parks and Wildlife (CPW),
- and the landowner on which the Diversion Structure is currently constructed.

2.0 FLORIDA CANAL HEADGATE DESIGN CONSIDERATIONS

The existing Diversion Structure conveys water to the Florida Canal headgate, located on the river right bank (northwest) immediately adjacent to the existing Diversion Structure. To convey water into the Florida Canal, an existing hand or remotely operated slide gate is opened and water is conveyed to the canal. Considerations for the existing headgate include the following:

- The headgate structure is located where sediment deposition regularly inundates and partially buries the slidegate. At the beginning of the irrigation season, the operator opens

the slide gate to clear this material and has the ability to return this water and sediment back to the river via an existing wasteway immediately downstream of the slidegate. The Project needs to incorporate a sluice gate or wasteway to allow the operator to continue this maintenance practice.

- Left bank maintenance access to the diversion structure needs to be maintained. Access for significant maintenance activities which require heavy equipment can only be facilitated via the left bank of the river.

- Maintain pre-rehabilitation project water surface elevations over the structure in order to maintain historical diversion amounts to the Florida Canal headgate and the adjacent landowner's headgate.

3.0 GENERAL DESIGN APPROACH

Attachment A provides a geotechnical engineering study (Geotechnical Report) for the Diversion Structure performed by Trautner Geotech, LLC. (Trautner) in September, 2018. This Geotechnical Report provides a set of geotechnical engineering recommendations for the existing and proposed Diversion Structure. Depending on the rehabilitation approach selected, important design recommendations provided in the Geotechnical Report include:

- integrity considerations for the existing structure,
- spread footing recommendations,
- lateral earth pressures,
- concepts for stabilizing streambed materials,
- and excavation and fill considerations during construction.

The current integrity of the existing structure is generally unknown. In order to reduce the risk of destabilizing the existing structure, the Geotechnical Report provides geotechnical recommendations for the construction of an independent structure, which will effectively buttress the existing Diversion Structure on the downstream side.

As a result, the overall rehabilitation approach is to design and install a foundationally secure structure to maintain diversion to the Florida Canal and the adjacent landowner's headgate, and integrate fish passage and safety components into the structures design. Recommended approaches from the Geotechnical Report to provide a secure foundation include:

- Grouted Rock Anchors: The structure could be foundationally secured through the use of grouted rock anchors (generally consisting of grout, epoxy, and steel) which would anchor the new structure or specific components to the underlying formational materials. The anchors should be bonded with conventional grout or an epoxy type bonding agent.
- Spread Footings: Conventional concrete spread footings (generally consisting of concrete, and steel) supported by the formational sandstone materials are also a potential option for the new structure. Due to the potential for scour of the streambed aggregate materials, and the relatively shallow depth of the formational materials below the streambed, the Geotechnical Report recommends spread footings extend to bear on the formational

sandstone materials, or possibly within the formational sandstone materials depending on the results of a scour analysis.

The remainder of this report provides a summary of the fish passage design and recreational safety components that will be considered as the design advances from concept to the preliminary design phase.

4.0 FISH PASSAGE DESIGN CONSIDERATIONS

Currently, the Florida Canal diversion structure acts as a fish barrier for native trout. Fish passage structures which attempt to mimic the natural environment and characteristics of the Florida River should be considered. There are three main criteria when evaluating the design for fish passage: stream velocity, vertical drop, and water depth.

4.1 Stream Velocity

Stream velocities within a fish passage structure should be less than the sustained swimming capability for each species in long uniform sections and less than burst swimming ability over short distances (Katopodis 1991). Stream velocity criteria will be evaluated through the use of hydraulic modeling over a range of design flow conditions to maximize the potential for fish passage.

The stream velocity at an existing impoundment can be reduced by lengthening the existing structure. The stream velocity can be further reduced by large roughness features built into the structure to provide variation in stream velocity vectors and refuge areas for the fish. The use of pools can also reduce the stream velocity. Richer (2015) provides a summary of hydraulic design criteria for fish passage structures in the Colorado Front Range which can be applied to the Florida River due to the same species of interest. Fish passage stream velocity criteria from this study is compiled in Table 1 to inform the fish passage design components under selected design flow conditions. If feasible, CPW recommends the fish passage structure target the lower velocity values presented in Table 1 over a wide range of flow conditions in an effort to increase the likelihood for native warmwater species to utilize the fish passage structure (Personal Communication, 2019).

Many secondary fish passage structures use high stream velocity attraction flow at or near their entrances. This practice is based on behaviors observed in salmonids. Migratory salmon and steelhead tend to identify upstream migration paths by “cueing-in” on higher velocity currents in the stream. A fishway entrance can be designed as a constriction to increase velocities compared to surrounding flow conditions, guiding fish into the structure based on their natural behaviors in finding upstream migration paths. (NRCS 2007).

4.2 Vertical Drop

Fish passage can be achieved using vertical drops by distributing a large vertical separation in the streambed caused by an impoundment through a series of multiple small drops in combination with pools which fish can navigate. The movement of fish through a small reach of steep slope can also be facilitated using the interstitial space between rocks where stream flow velocities tend to be less.

The jumping heights of target species are an important consideration when designing a fish passage structure. An evaluation of the pool depth and length before a vertical drop is necessary to determine if the fish can generate enough speed to clear the drop. On average, trout have the ability to jump 1.5 times the pool depth up to a maximum of 1 foot. The jump pool depth (where entrance jumps are planned) must be at least 1.5 times the jump height or at least 2 feet deep to account for resting requirements of salmonid species. In addition, pool spacing and configuration should satisfy resting requirements of all target species (NRCS 2007).

Fish passage vertical drop criteria from Richer (2015) and NRCS (2007) are compiled in Table 1 and will be used to inform the design of step-pool or cross vane style fish passage structures under selected design flow conditions. If feasible, CPW recommends the fish passage structure target the lowest vertical drop value presented in Table 1 in an effort to increase the likelihood for native warmwater species to utilize the fish passage structure (Personal Communication, 2019).

4.3 Minimum Depth

Minimum low-flow depths within the passage should be maintained to accommodate fish size, swimming abilities, and behavioral responses (NRCS, 2007). Minimum depth criteria from Richer (2015) and NRCS (2007) are compiled in Table 1 and will be used to inform the design under selected design flow conditions. If feasible, CPW recommends the fish passage structure target the deepest minimum depth value presented in Table 1 in an effort to increase the likelihood for native warmwater species to utilize the fish passage structure (Personal Communication, 2019).

5.0 SAFETY CONSIDERATIONS

The current diversion structure is acting as a low head dam and creates a hazardous condition through this section of the Florida River. Hazards associated with low-head dams include the following (IDNR, 2017):

- Vertical concrete abutments that are difficult to scale if a drowning victim manages to reach it.
- Debris can become trapped in reverse roller downstream of the dam, along with a drowning victim, creating trauma hazards. The structure should include sufficient flow-through to flush debris.
- Certain reverse roller conditions downstream of the dam may cause air bubbles to mix into the water decreasing the buoyancy by one-third, which makes staying afloat more difficult and can prevent a drowning victim from escaping.
- Trash racks in front of headgates should be maintained to reduce the potential for a victim to become trapped by the suction caused by a headgate.
- Safety during structure maintenance should also be considered. The need for safety appurtenances such as handrails, and safe and stable access for maintenance equipment should be evaluated with the FCDC.

It is important that the design incorporate features which eliminate the hazardous conditions and associated reverse roller currently caused by the Diversion Structure.

6.0 ADDITIONAL DESIGN CONSIDERATIONS

Additional considerations for the Project include the following:

- Early discussions with the landowner indicate they would prefer a rehabilitation approach which minimizes the footprint of the proposed structure. As a result, either an instream step-pool structure or secondary fish passage channel may be good alternatives to address the landowner's preference.

- The primary spawning and migration season for trout can vary depending on the actual species. Rainbow trout spawn in the late spring and early summer, while brown trout spawn in the fall. Therefore, it is critical that the fish passage structure function properly during spring and fall flow regimes.

7.0 HYDROLOGIC ANALYSIS

7.1 USGS Gage - Florida River Below Florida Farmers Ditch near Durango, CO Annual Flood Frequency Analysis

The Diversion Structure is located between Lemon Dam (nine miles upstream) and the USGS streamflow gage 09363050 – Florida River Below Florida Farmers Ditch near Durango, CO (Florida Gage). The Florida Gage is located approximately two miles downstream of the Diversion Structure, and was used to evaluate expected flood flows at various frequencies at the Diversion Structure. Table 2 provides a summary of the flood frequency analysis calculated using the U.S Army Corps of Engineers (USACE) HEC-SSP model (Bartles et. al, 2016). This HEC-SSP analysis is typically used to inform the design of a fish passage structure in Colorado, and the bankfull discharge is typically associated with the 1 to 2-year flood return interval event.

The Florida Gage has been in operation since 1967. The USGS operated the gage from 1967 to 1982. After 1982, the gage has been operated by the Colorado Division of Water Resources. Digital streamflow data is available for the following periods: 1) 1968 to 1982 and 2) 1999 to present. Between 1983 to 1999 the gage records are only available in paper form and were not included in this analysis. The annual flood frequency analysis was completed on 35 years of record (1968 to 1982 and 1999 to 2018).

The Florida Gage is located downstream of the Florida Farmers Ditch, and does not include water diverted by the Ditch from the River upstream of the gage. To account for the Florida Farmers Ditch diversion upstream of the gage, monthly diversion records were converted into average daily diversions and added back into the daily Florida Gage records before entering into HEC-SSP.

Lemon Dam provides flood control for the Florida River. The largest flow recorded at the Florida Gage (from available data) was approximately 1,100 cfs in May of 1973. Since Lemon Dam serves as a flood control facility, WWE also performed a Lemon Dam release analysis which is provided in the following section.

7.2 Lemon Dam Release Analysis

Lemon Dam, approximately nine river miles upstream of the Diversion Structure provides flood-control and regulates flow in the Florida River. Releases from the dam are generally low during the non-irrigation season, and increase during the irrigation season. During the irrigation season, releases are primarily made to meet irrigation demands. Lemon Dam release data from 1963 to 2018 is available from the United States Bureau of Reclamation (USBR) Reclamation Water Information System (RWIS)[1].

Figure 2 provides an average daily discharge duration curve for releases made from Lemon Dam during the irrigation season (May through October). As shown in Figure 2, the largest release made from Lemon Dam since 1963 was approximately 1,000 cfs.

During the irrigation season, the typical range of releases (between 40% and 60%) range between approximately 200 and 140 cfs. Releases during the irrigation season are generally made to meet the irrigation season direct flow water rights for the Florida Farmers Ditch and the Florida Canal.

Figure 3 provides an average daily discharge duration curve for releases made from Lemon Dam during the non-irrigation season (November through April). As shown in Figure 3 releases during the non-irrigation season are typically around 11 cfs (between 40% and 60%).

7.3 Recommended Structure Performance for Selected Design Flows

Based on the information provided in sections 7.1 and 7.2, WWE is recommending the following structure performance criteria for selected design flows:

- **Fish Passage Performance:** all fish passage design criteria should be met between a non-irrigation season low flow of approximately 10 cfs and a typical irrigation season flow of approximately 200 cfs.

- **Structure Safety:** Considerations for structure safety should be evaluated for flows up to approximately 1,000 cfs.

- **Structure Stability:** Since Lemon Dam is a flood control facility, the structure should be designed to remain stable during a flow of approximately 1,500 cfs, which approximately corresponds to the 50-year flood event, and is greater than the largest release made from Lemon Dam (based on available data).

Please note that the recommended design flows presented herein in may be revised as additional comments are received from Project stakeholders and other potential project constraints are evaluated during the design process.

[1]Reclamation Water Information System Access: https://water.usbr.gov/RWISmap.php

8.0 REFERENCES

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Tables

Table 1.
Fish Passage Design Requirements

Factor	Value Range or Metric	Comments
Spawning season	April 1 – June 30 and September 15 - November 15	Proper functioning of the passage is most critical during the spawning season,
Stream Velocity Criteria		
Stream Velocity	3-6 feet/second	Design flow velocities should not exceed 6 ft/s for all expected flow conditions.
Vertical Drop Criteria		
Vertical Drop	0.5 ft – 1.0 ft	A vertical separation between crest of two drops should not exceed 1 ft.
Minimum Depth Criteria		
Minimum Depth	0.5 ft – 1.0 ft	Provide a minimum pool depth to jump height ratio of 1.5

References:

1. NRCS, 2007. NEH 654 (National Engineering Handbook) Technical Supplement 14N, Stream Restoration Design National Engineering Handbook (210-VI-NEH). Washington, D.C.: USDA Natural Resources Conservation Service.

2. Richer, E., Kondratieff, M., Swigle, B., 2015. Post-Flood Recovery Assessment and Stream Restoration Guidelines for the Colorado Front Range. Colorado Parks and Wildlife, Fort Collins, CO.

Table 2.
Annual Peak Flood Frequency Analysis – USGS Gage Florida River Below Florida Farmers Ditch near Durango, CO

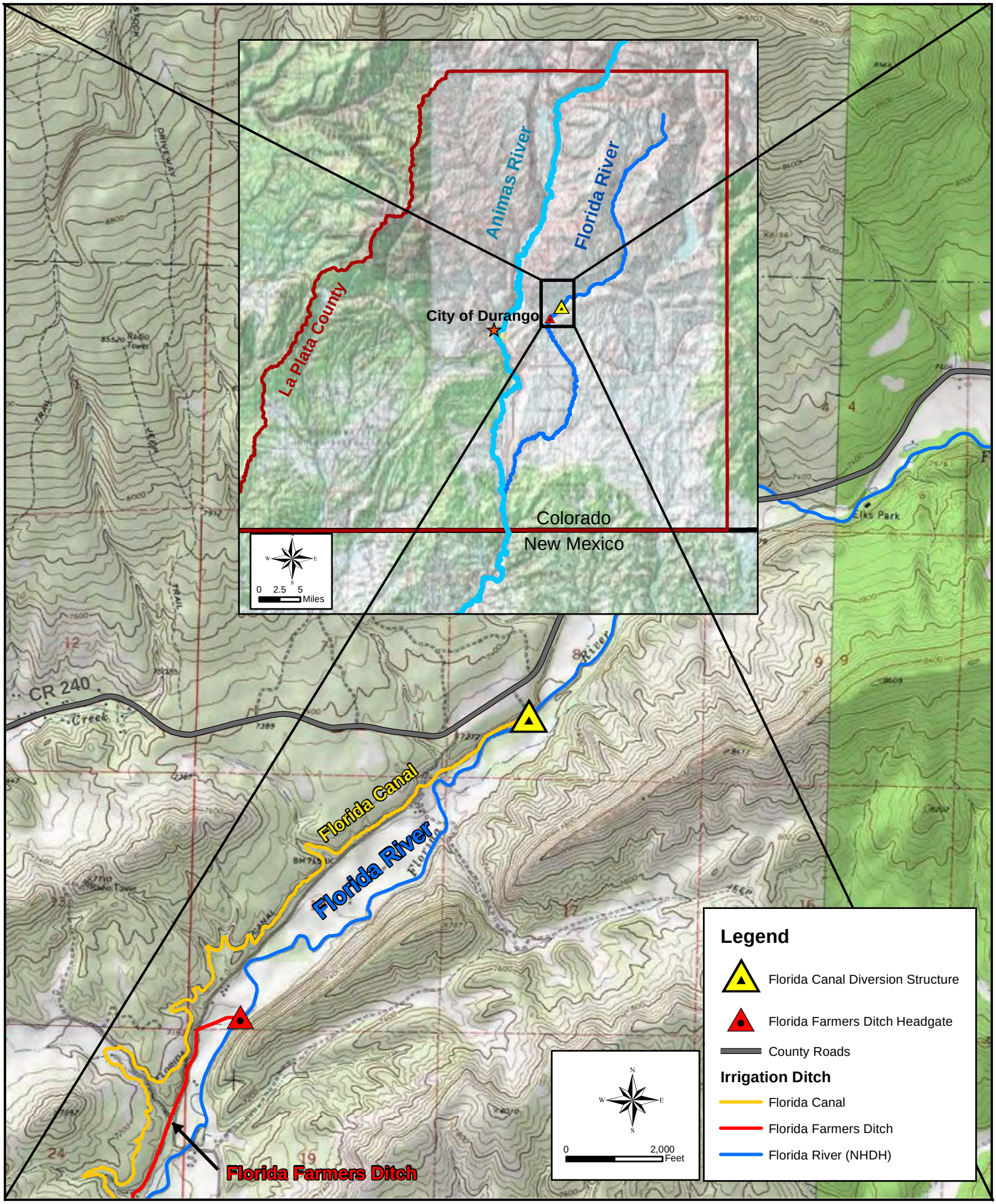
Percent Chance Exceedance	Return Interval	Lower 95 % Confidence Limit	Computed Value	Upper 95 % Confidence Limit
(%)	(years)	(cfs)	(cfs)	(cfs)
0.2	500	1620	2546	4822
0.5	200	1397	2146	3917
1	100	1226	1847	3265
2	50	1053	1552	2646
5	20	822	1172	1889
10	10	645	895	1370
20	5	466	628	906
50	2	221	292	388
66.6	1.5	139	189	249
90	1.1	46	72	101
95	1.1	27	46	68
99	1	9	19	31

References:

1. Bartles, M., G. Brunner, M. Gleming, B. Faber, and J. Slaughter, 2016. HEC-SSP Statistical Software Package Version 2.1. US Army Corps of Engineers, Institute for Water Resources, Hydrologic Engineering Center, 609 Second Street, Davis, CA

2. USGS Streamflow Gage 09363050 – Florida River Below Florida Farmers Ditch near Durango, CO

Figures



Document Path: P:\061-110\140 Florida Canal Diversion Dam\05 Mapping\Florida Canal Diversion Structure - Location Map.mxd

WWE
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LA PLATA COUNTY, CO

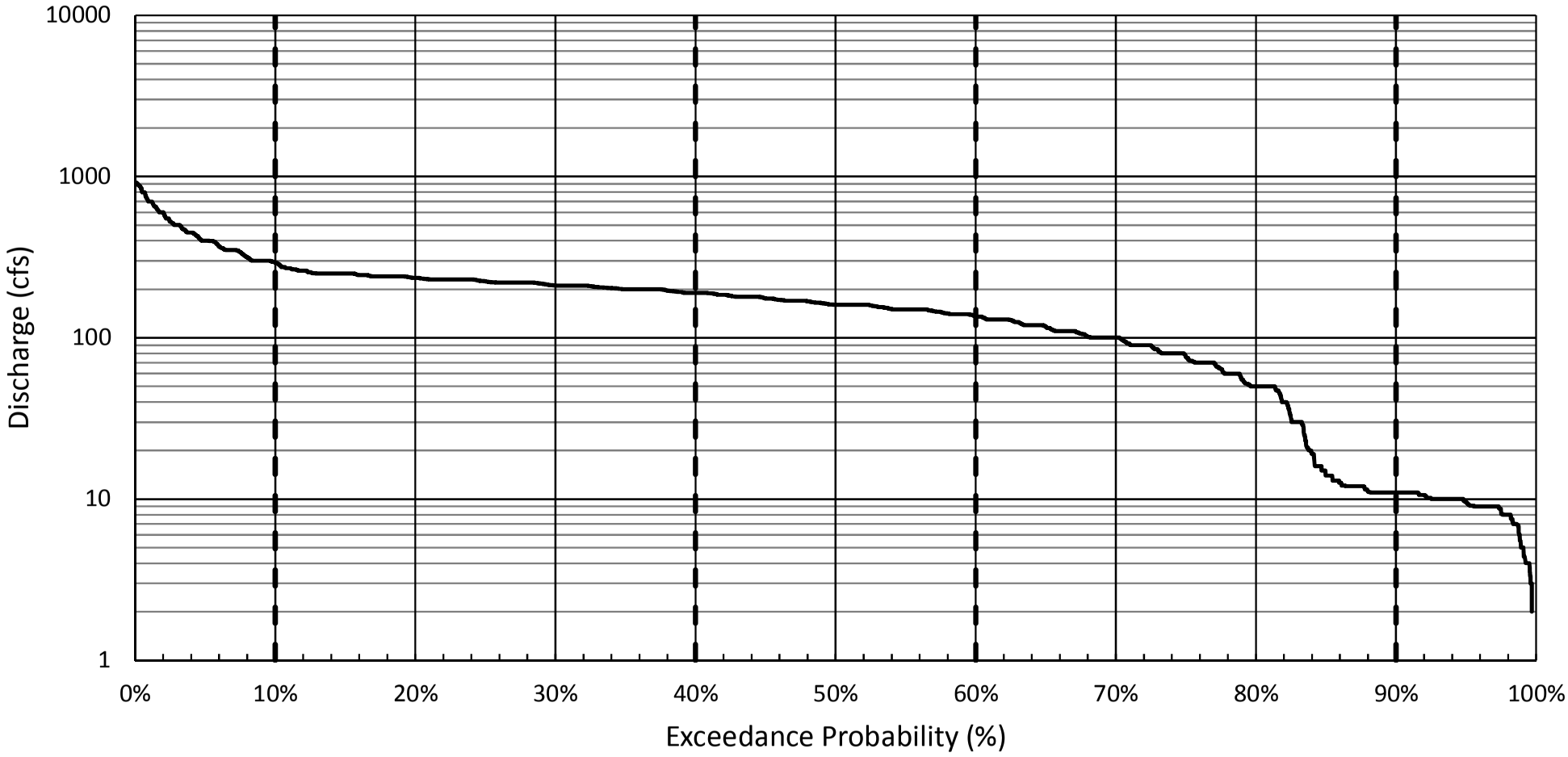
FLORIDA CANAL DIVERSION STRUCTURE - LOCATION MAP

FLORIDA CONSOLIDATED DITCH COMPANY

PROJECT NO. 061-110.140

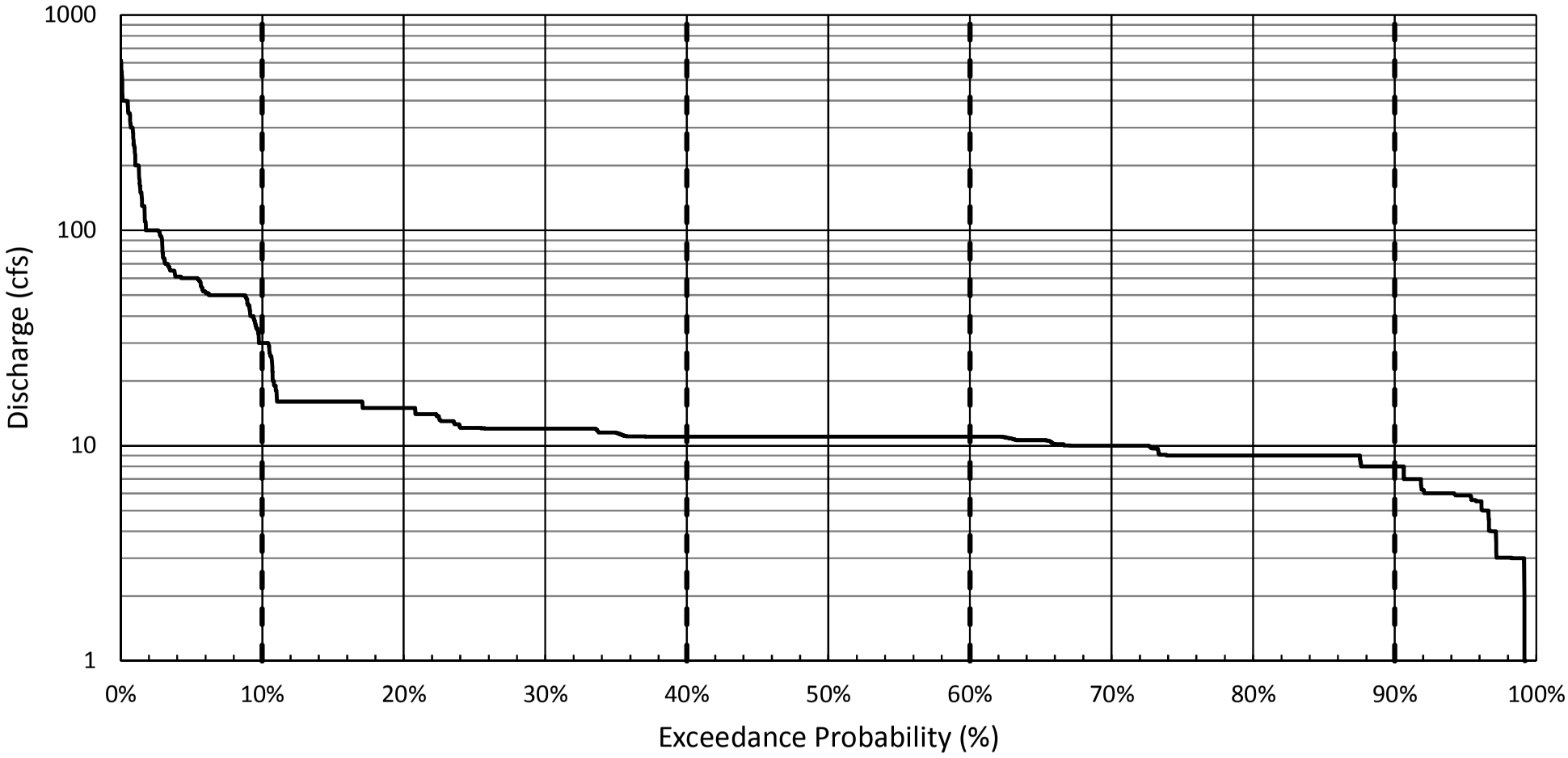
FIGURE 1

Figure 2. Average Daily Lemon Dam Release Curve - Irrigation Season - May through October (1963-2018)



Source: United States Bureau of Reclamation (USBR) Reclamation Water Information System (RWIS)

Figure 3. Average Daily Lemon Dam Release Curve - Non-Irrigation Season - November through April (1963-2018)



Source: United States Bureau of Reclamation (USBR) Reclamation Water Information System (RWIS)

Attachment A

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

GEOTECHNICAL ENGINEERING STUDY

FOR THE

FLORIDA RIVER CANAL DIVERSION STRUCTURE

Durango, Colorado

September 14, 2018

Prepared For:
Mr. Hayes Lenhart, P.E.
Wright Water Engineers, Inc.
Project Number: 55335GE

649 Tech Center Drive Suite A • Durango, CO 81301 • 970/259-5095 • Fax 970/382-2515

PN: 55335GE
September 14, 2018

PN: 55335GE
September 14, 2018

1.0 REPORT INTRODUCTION

This report presents our geotechnical engineering recommendations for the proposed Florida River Canal Diversion Rehabilitation Project. This report was requested by Mr. Hayes Lenhart, P.E., Wright Water Engineers, Inc. The field study was performed on August 8 and 15, 2018. The laboratory study was completed on August 20, 2018.

The information provided in this report may be used to help develop a design and subsequently implement construction strategies that are appropriate for the subsurface soil and water conditions. It is important that we be consulted throughout the design and construction process to verify the implementation of the geotechnical engineering recommendations provided in this report. The recommendations and technical aspects of this report are intended for design and construction personnel who are familiar with construction concepts and techniques, and understand the terminology presented below.

The geotechnical engineering report is the beginning of a process involving the geotechnical engineering consultant on any project. It is common for unforeseen, or otherwise variable subsurface soil and water conditions to be encountered during construction. As discussed in our proposal for our services, it is imperative that we be contacted during the project excavation stage to verify that the conditions encountered in our field exploration were representative of those encountered during construction. Materials testing services are equally important tasks that should be performed by the geotechnical engineering consultant during construction. We should be contacted during the construction phase of the project and/or if any questions or comments arise as a result of the information presented below.

The following outline provides a synopsis of the various portions of this report;

- Sections 1.0 and 2.0 provide an introduction and an establishment of our scope of service.
- Sections 3.0 and 4.0 of this report present our geotechnical engineering field and laboratory studies.
- Section 5.0 presents our geotechnical engineering design parameters and recommendations which are based on our engineering analysis of the data obtained.
- Section 6.0 provides a brief discussion of construction sequencing and strategies which may influence the geotechnical engineering characteristics of the site.

The construction considerations provided in Section 6.0 of this report is not intended to address all of the construction planning and needs for the project site. The recommendations/overview provided are intended to aid the owner, design team, and contractor in understanding construction concepts that may influence some of the geotechnical engineering aspects of the site and proposed development.

The data used to generate our recommendations are presented throughout this report and in the attached figures.

1.1 *Scope of Project*

We understand that the proposed project will consist of rehabilitating the Florida Canal diversion structure. The new structure will allow passage of fish, and may consist of a stacked boulder ladder type structure. The existing crib wall diversion structure may be removed or remain in place as part of the project. Cast in place reinforced concrete structures may also be included with the project.

2.0 GEOTECHNICAL ENGINEERING STUDY

Our services include a geotechnical engineering study of the subsurface soil and water conditions for development of the proposed structure(s) at the subject project site.

2.1 *Geotechnical Engineering Study Scope of Service*

The scope of our study which was delineated in our proposal for services, and the order of presentation of the information within this report, is outlined below. It should be noted that the actual scope of services performed for our field and laboratory study varied somewhat from that outlined in our proposal due to the subsurface conditions encountered at the project site.

Field Study

- We advanced two NW wireline core borings and one conventional auger test borings at select areas downstream of the existing crib wall structure. The core boring was originally advanced directly below the south side of the crib wall structure within the stream bed area (Test Boring TC-1). Due to the potential for releasing rock flour cuttings down the river we shifted the boring further to the south above the river channel (Test Boring TC-1A). Test Boring TB-2 was advanced with conventional hollow stem auger towards the north side of the river channel below the existing concrete outlet structure for the canal.
- Rock core was retrieved from our core borings. We were not able to retrieve split spoon samples or bag samples from the borings due to the nature of the subsurface materials.
- We performed a streambed particle size evaluation above and below the existing crib wall structure.

Laboratory Study

We were not able to perform Atterberg limits, swell-consolidation tests, or direct shear strength tests on the subsurface soil materials encountered in our test borings (as proposed in our proposal for services) due to the large size and very granular nature of the subsurface soils that overlie the formational materials. The laboratory testing and analysis of the samples obtained included;

- Evaluation of rock core obtained from Test Boring TC-1A;
  - Rock Quality Designation (RQD) and core recovery calculations,
  - Unit weight measurements for select rock core, and,
  - Unconfined compressive strength tests of select sections of rock core.
- Sieve analysis of streambed particles obtained during our field study.
- Soluble sulfate content tests on select rock core to assess the corrosion potential of the formational materials on Portland cement concrete.

Geotechnical Engineering Recommendations

- This report addresses the geotechnical engineering aspects of the site and provides recommendations including;

Geotechnical Engineering Section(s)

- Subsurface soil and water conditions that may influence the project design and construction phases (Section 3.0).
- A general discussion regarding the anticipated characteristics of the existing crib wall structure as they relate to the subsurface conditions that we encountered in our test borings (Section 5.1).
- A discussion of the streambed particle characteristics that may be used by others to help evaluate potential scour depths (Section 4.0).
- Geotechnical engineering parameters (Section 5.0) including;
  - ✓ Viable foundation system concepts including bearing capacity values for potential new structures,
  - ✓ Anticipated frictional capacities for grouted anchors that extend into the formational sandstone materials that underlie the river,
  - ✓ Anticipated lateral earth pressure values for the granular streambed deposits, and,
  - ✓ A discussion regarding the potential use of grouting to help stabilize the streambed deposits below the proposed diversion structure.

Construction Consideration Section

- Fill placement considerations including cursory comments regarding site preparation and grubbing operations,
- Considerations for excavation cut slopes,
- Natural soil preparation considerations for use as backfill on the site, and,
- Compaction recommendations for various types of backfill proposed at the site.

- This report provides design parameters, but does not provide foundation design or design of structure components. The project architect, designer, structural engineer or builder may be contacted to provide a design based on the information presented in this report.

- Our subsurface exploration, laboratory study and engineering analysis do not address environmental or geologic hazard issues.

3.0 FIELD STUDY

3.1 *Project Location*

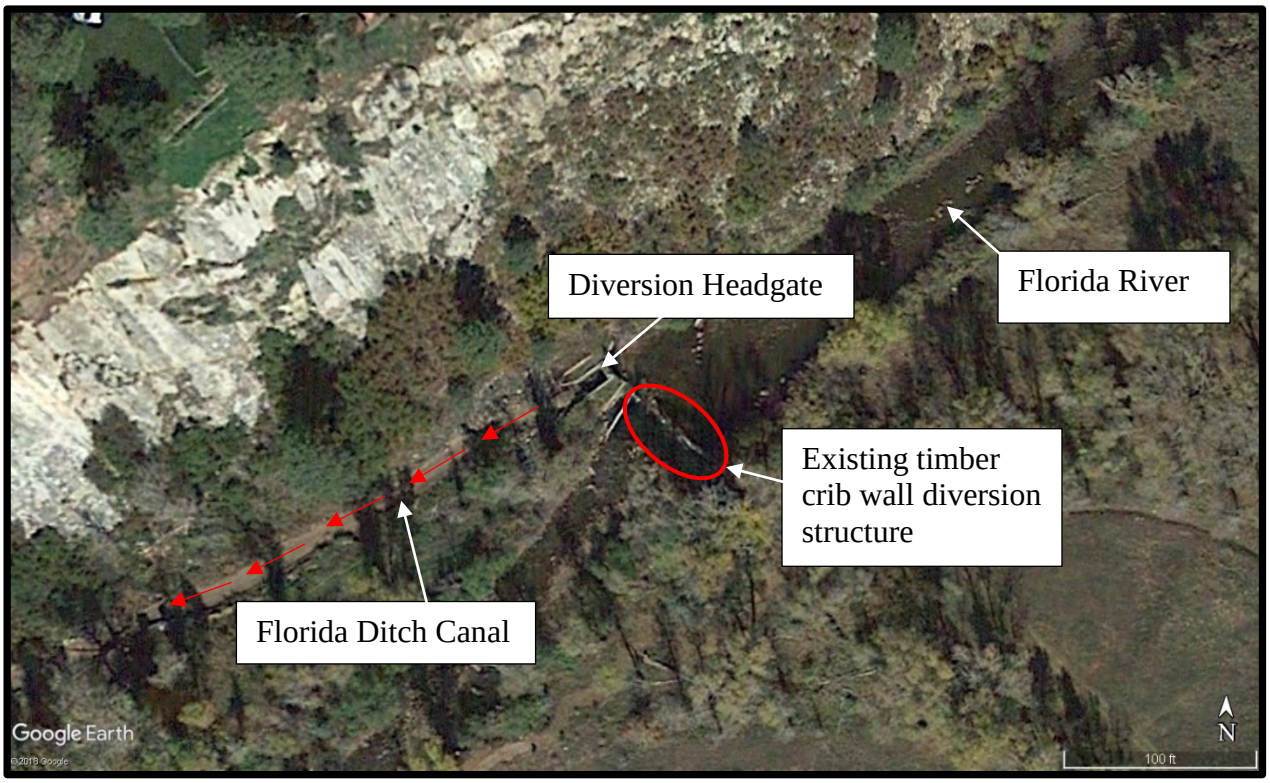
The project site is located at the existing diversion structure on the Florida River. The existing diversion structure is located on or adjacent to private property approximately 750 feet downstream from the County Road 248 bridge that crosses the Florida River. The project site is located within La Plata County Limits, approximately 5 miles east of Durango, Colorado. County Road 248 is accessed from County Road 240 (Florida Road). The approximate location of the project site is provided on Figure 3.1 below. The imagery used for Figure 3.1 was obtained from Google Earth (imagery date: 10-12-2015).

Figure 3.1: Approximate Location of Project Site

3.2 *Site Description and Geomorphology*

Figures 3.2.1 and 3.2.2 presented below may be referenced to help clarify the site description that follows. The imagery used for the figure below was obtained from Google Earth (imagery date: 10/12/2015).

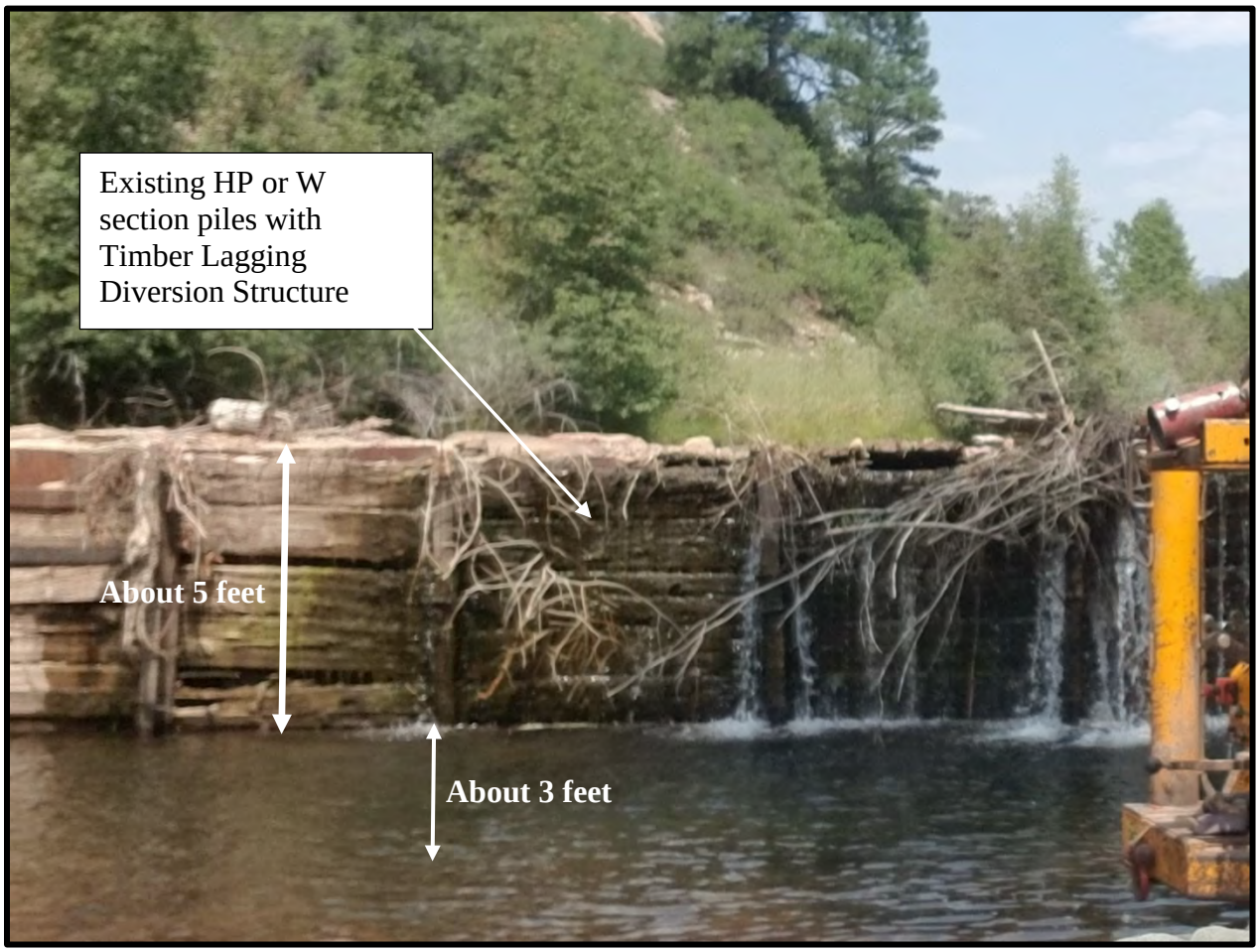
Figure 3.2.1: Florida Canal Diversion Structure Site Description



The Florida River Drainage in the area of the project site is located directly below southeast facing outcrops of the Point Lookout Sandstone. The rock outcrops slope steeply down to the southeast at about a 45 degree angle. The ground surface surrounding the southeast side of the Florida River Channel is relatively flat. Water flow within the Florida River Channel is primarily regulated by Lemon Reservoir (not including precipitation events), located approximately 8 miles northeast (upstream) from the subject diversion structure. The shallow river channel deposits consist of alluvial gravel and cobble deposits. As discussed in Section 3.3 below, the formational sandstone materials are located at relatively shallow depths below the river channel.

The existing diversion structure consists of HP or W section piles with timber lagging that retains alluvial river deposits at an elevation necessary to divert water into the adjacent Florida Ditch/Canal. Figure 3.2.2 provided below indicates the characteristics of the existing diversion structure.

Figure 3.2.2: Photograph of Existing Diversion Structure (view looking upstream)



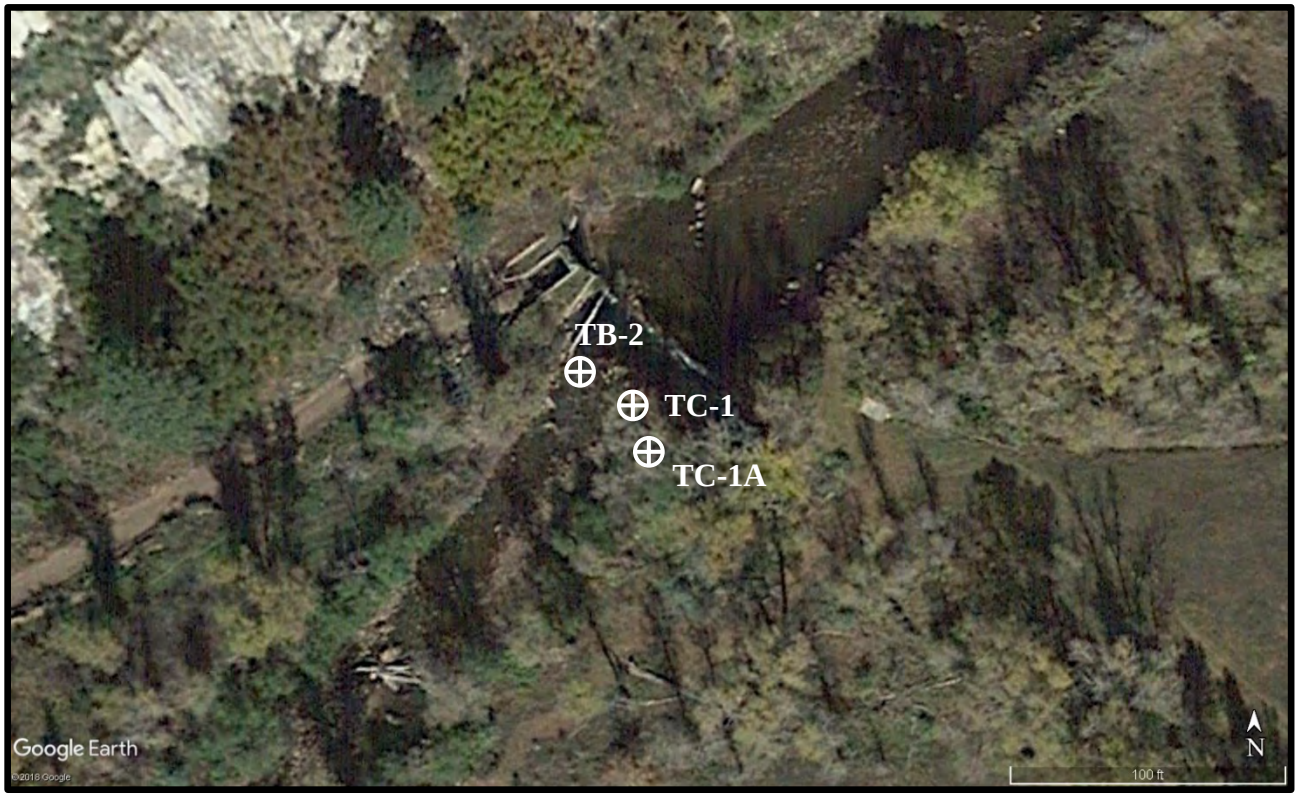
We understand that the existing pile and lagging diversion structure was constructed over 100 years ago. The height of the structure above the downstream tailwater pool elevation (at the time of our field study with very limited water flow in the river) was in the range of about 5 feet. The alluvial deposits below the downstream pool elevation have been displaced or scoured to a depth of about 3 feet below the tail water elevation (at the time of our field study) for the majority of the structure length (about 65 lineal feet). Therefore, the retained height of alluvial deposits behind the majority of the length of the diversion structure is in the range of about 7 to 8 feet. We have discussed the characteristics of the existing diversion structure in more detail in Section 5.1 below.

The head gate structure for the Florida Ditch was constructed in the relatively recent past, and appears to consist of a steel reinforced cast-in-place concrete structure. We do not know the specific details regarding this structure, such as the bearing elevation of the structure. We suspect that the structure is conventionally supported as a spread footing. We do not know whether or not the structure is supported on the formational sandstone materials that underlie the alluvial river deposits, or by the granular alluvial river deposits.

3.3 *Subsurface Soil and Water Conditions*

We advanced two NW wireline (NQ core diameter) borings, referred to as Test Borings TC-1 and TC-1A, and one hollow stem auger boring referred to as Test Boring TB-2. As discussed above, Test Boring TC-1 was abandoned at a depth of about 3 feet below the river elevation. The approximate locations of our test borings are shown on Figure 3.3 below. The imagery used for Figure 3.3 was obtained from Google Earth (imagery date: 10/12/2015). The logs of the soils encountered in our test borings are presented in Appendix A.

Figure 3.3: Approximate Test Boring Locations



The approximate test boring locations shown on the figure above were prepared using notes taken during the field work and are intended to show the approximate test boring locations for reference purposes only.

Test Borings TC-1 and TC-1A were advanced with NW wireline core drilling techniques in order to advance the boring through the very dense cobble and boulder sized materials, and collect data for the formational materials that underlie the project site. Test Boring TC-1 was abandoned at a depth of about 3 feet below the streambed elevation in dense cobble deposits. Test Boring TC-1A was advanced about 20 feet south of the streambed, and at an elevation of about 3 feet above the streambed elevation. In Test Boring TC-1A we generally encountered dense to very dense gravel and sand with periodic cobbles and boulders to a depth of about 8 feet below the ground surface elevation adjacent to our boring (about 5 feet below the streambed elevation) where we encountered the underlying Point Lookout Sandstone Formation. The formational materials encountered in Test Boring TC-1A consisted of very hard gray colored sandy shale to gray sandstone materials. The boring was advanced to a depth of about 20 feet below the ground surface elevation.

Test Boring TB-2 was advanced within the stream channel, adjacent to the north side of the river (below and to the southwest of the more recently constructed concrete head gate structure). We utilized 3.25 inch inside diameter hollow stem auger to advance the boring. In Test Boring TB-2 we encountered very dense sandy gravel and cobbles from the streambed elevation to a depth of about 5 feet below the streambed elevation where we encountered the Point Lookout Sandstone Formation. The formational materials encountered consist of very hard white sandstone material. The boring was advanced to auger refusal at a depth of about 8 feet below the streambed elevation within the very hard formational sandstone materials.

The logs of the subsurface soil conditions encountered in our test borings are presented in Appendix A. The logs present our interpretation of the subsurface conditions encountered exposed in the test borings at the time of our field work. Subsurface soil and water conditions are often variable across relatively short distances. It is likely that variable subsurface soil and water conditions will be encountered during construction. Laboratory soil classifications of samples obtained may differ from field classifications.

3.4 *Site Seismic Classification*

The seismic site class as defined by the 2009 International Building Code is based on some average values of select soil characteristics such as shear wave velocity, standard penetration test result values, undrained shear strength, and plasticity index. We feel that overall the subsurface conditions on the project site warrant a Site Class C designation, primarily based on the deeper soil/gravel profile that is suspected in areas upstream of the diversion structure. The seismic site class is borderline between a Site Class B and C designation.

4.0 LABORATORY STUDY

This section of the report provides a description of the laboratory tests that we performed for the project. The laboratory test results are tabulated below. The gradation curves for the stream bed D_{50} analyses are presented in Appendix B.

We were not able to perform the swell-consolidation or direct shear strength tests as outlined in our proposal for services due to the very granular nature and large gravel/cobble particle sizes that make of the subsurface materials on this project site.

Rock Quality Designation and Recovery of Rock Core: We measured the percent recovery and rock quality designation (RQD) of the core that we recovered from Test Boring TC-1A. The results of these measurements are presented on the log of this boring in Appendix A. We generally obtained 100% core recovery within the formational materials. The RQD values of the formational material cored were generally in the range of about 80 to 90 percent indicating relatively high quality or relatively low fracturing within the formational materials.

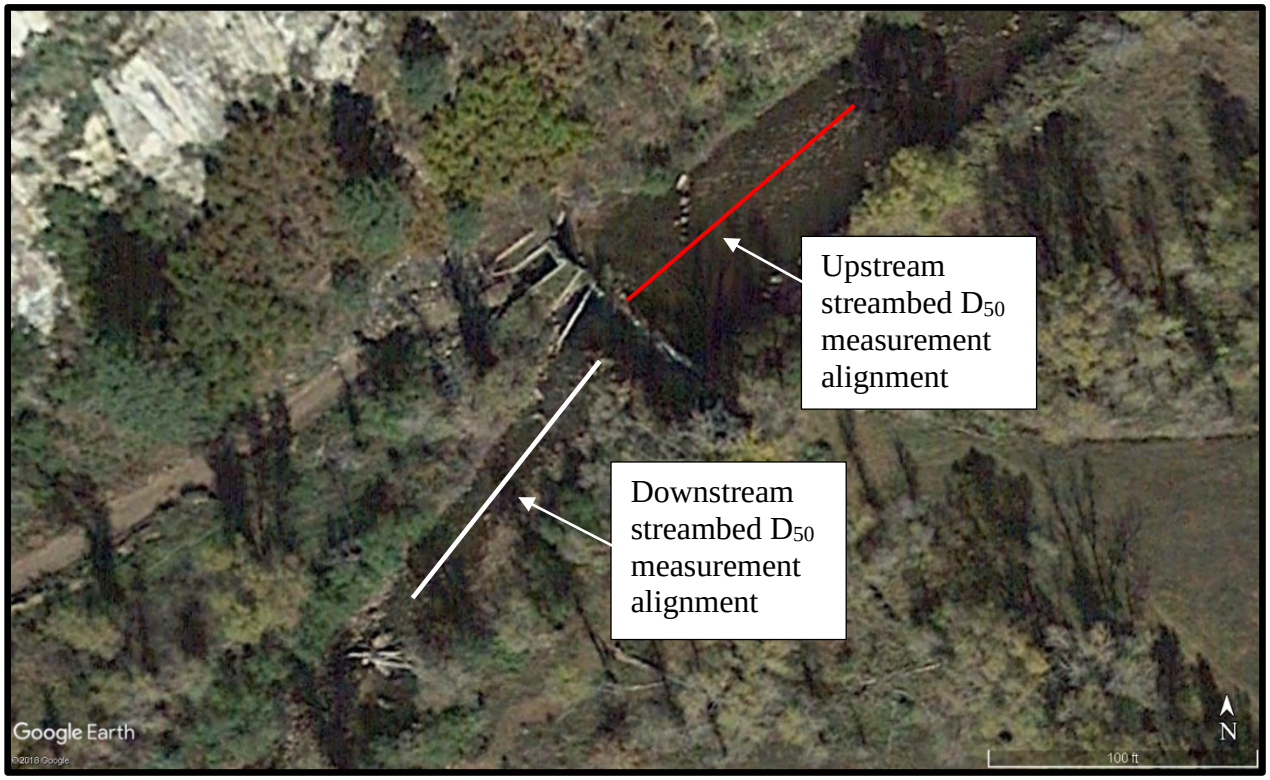
Unconfined Compressive Strength of Rock Core: We performed unconfined compressive strength tests on select section or rock core obtained from the formational sandstone materials encountered in Test Boring TC-1A. In addition, we measured the density of the unconfined compressive strength test samples. The results of these tests are tabulated below. The depths of the test samples provided below are based on the depth below the ground surface elevation of the core boring, about 3 feet above the streambed elevation.

Sample Designation and Location	Material Description	Sample Density (pcf)	Sample Unconfined Compressive Strength (psi)
TC-1A at 9 feet	Gray Sandy Shale	155.7	7,340
TC-1A at 12 feet	Gray Sandstone	158.1	11,060
TC-1A at 19 feet	Gray Sandstone	147.2	11,410

Soluble Sulfates Tests: We performed soluble sulfate content tests on a select section of rock core obtained from the formational sandstone materials encountered in Test Boring TC-1A and formational cuttings obtained from Test Boring TB-2 in order to help assess the corrosion potential of the formational materials on Portland cement concrete or Portland cement grout. The section of rock core tested was obtained from Test Core TC-1A at a depth of about 8 feet below the ground surface elevation, and the sample tested from Test Boring TB-2 was obtained at depths ranging from about 5 to 8 feet below the streambed elevation. We obtained a soluble sulfate content of about 100 parts per million (ppm) which indicates a low sulfate exposure potential. We recommend that concrete or grout associated with the project exhibit a maximum water/cement ratio of 0.50 and either a type II, IP(MS), IS(MS), P(MS), I(PM)(MS), or a I(SM)(MS) cement be used.

Streambed Particle Size Analysis: We obtained field samples of exposed streambed gravel and cobble sized particles along an alignment within the active stream bed above and below the existing diversion structure. The field sample was obtained by selecting the exposed rock particle at 2-foot intervals down a 100 lineal foot string-line alignment that parallels the river. The composite sample of rock particles obtained was then returned to our laboratory for sieve analysis testing. Some of the rock sizes were too large to collect. Estimations of the larger cobble and boulder measurements and associated weight were made in the field. The alignment used for our field sampling is shown on Figure 4.1 below. The imagery used for this figure was obtained from Google Earth.

Figure 4.1: Streambed Particle Size Analysis Field Sample Alignments



The results of the sieve analysis testing performed are presented on Figure 4.1 for the upstream alignment and on Figure 4.2 for the downstream alignment. Based on our field measurements, a D_{50} particle size of about 4.5 inches was calculated for the surface streambed particles upstream of the existing diversion structure, and a D_{50} particle size of about 17 inches was calculated for the surface streambed particles downstream of the existing diversion structure. An average density of about 158 pounds per cubic foot was calculated for the collected gravel and cobble sized materials.

We anticipate that the difference between the upstream and downstream particle sizes is due to hydraulic sorting of the particles above the existing diversion structure. It should be noted that a few boulder size materials encountered along the downstream alignment greatly increased the downstream D_{50} particle size. It is apparent that scouring or displacement of the particles directly below the existing diversion structure has occurred in the past.

5.0 GEOTECHNICAL ENGINEERING DISCUSSION AND RECOMMENDATIONS FOR THE EXISTING AND PROPOSED DIVERSION STRUCTURE

This section of the report provides geotechnical engineering design parameters that may be used for the structure design (Section 5.2). We have also provided a somewhat speculative discussion regarding the characteristics of the existing diversion structure (Section 5.1). We understand that the project at this point is in a conceptual design phase. It is possible that additional geotechnical engineering information may be needed as the project design progresses. We should be contacted to evaluate whether or not the information provided in this report is valid for the final chosen design.

5.1 *Geotechnical Engineering Related Discussion for the Existing Structure*

This section of the report provides a discussion regarding the geotechnical engineering related characteristics of the existing structure. It should be noted that the information provided below is largely based on speculation as we are not aware of the construction methods used for the existing diversion structure. Based on the information that we have at this time, it appears that the existing structure consists of steel HP (H-pile) or W section piles with timber lagging placed on the upstream side of the piles. We do not know how the piles were placed during the original diversion structure construction. It is possible that the piles were conventionally driven, placed in predrilled borings, or the piles were placed by excavating the alluvial gravel deposits and backfilling around the piles.

We encountered very hard formational sandstone material at a depth of about 5 feet below the existing stream channel. If the piles were conventionally driven, then it is unlikely that the tip bearing elevation extends into the formational materials to any measurable extent due to the very hard nature of the formational materials. If this is the case, the piles may only be currently embedded in about 2 feet of alluvial gravel/cobble material. It is possible that the original construction included pre-drilling the pile locations to achieve embedment into the formational materials.

The lateral resistance capacity of the existing piles is greatly influenced by whether or not embedment into the formational materials was achieved. At this point it is difficult to speculate whether or not the existing piles exhibit any embedment into the formational sandstone materials.

Figure 3.2.2 presented above may be referenced to help clarify the following discussion. Based on our rough field measurements, the portion of the existing diversion structure located above the tailwater pool retains approximately 5 vertical feet of alluvial gravel deposits, plus an additional approximate 3 vertical feet of material below the tailwater elevation due to the depth of the tail water pool. Given these rough measurements, then the existing pile and timber cribbing diversion structure in the area above the tailwater pool is retaining about 8 feet of alluvial gravel deposits. In addition to the lateral pressures applied by the alluvial gravel deposits, net hydrostatic water pressures driving movement of the crib wall will exist for the upper 5 feet of retained material (assuming water exists at the river channel elevation).

Based on an assumed angle of internal friction of about 40 degrees for the retained alluvial gravel deposits, and accounting for hydrostatic pressures acting on the upper approximate 5 feet of the wall, we anticipate that a resultant force in the range of about 2,000 pounds per lineal foot of wall may exist for the portion of the crib wall above the tailwater pool. This results in a rather substantial lateral force and resulting moment acting on the individual piles that are spaced about 5 to 6 feet apart from one another when the tributary area force that acts on each individual pile is calculated. If the piles were embedded in only about 2 to 3 feet of alluvial material (tip elevation at the surface of the formational material) then we doubt that the structure could withstand the lateral forces acting on it. We anticipate that some embedment of the piles into the underlying formational materials, or possibly some type of tie back anchor such as a “dead man” structure affixed to the piles must exist in order to resist the shear and moment forces acting on the piles. It also may be possible that large boulder sized materials were stacked behind the existing crib wall, with the boulders effectively acting as a gravity wall, with little lateral force being transferred to the existing crib wall.

As discussed above, based on the information obtained to date, it is difficult to predict or calculate the structural integrity of the existing crib wall due to the various unknown characteristics of the wall, particularly the embedment characteristics of the piles. There may be non-destructive types of testing such as ground penetrating radar to help gain further information regarding the embedment of the existing piles. We are available to assist with efforts to obtain further information regarding the structural aspects of the existing diversion wall at your request. Additional information regarding the characteristics of the existing structure will need to be determined if it is decided to incorporate the existing crib wall structure as a structural element for the new or modified proposed diversion structure.

We have provided a number of concepts below that may be applicable to help bolster the existing crib wall system.

- The embedment depth and strength characteristics of the existing piles could be further explored to assess whether or not the existing piles are adequate to provide continued lateral support to the retained streambed. The existing cribbing would likely need to be reconstructed in the near future.

- New W or HP pile sections could feasibly be installed to brace a new crib wall system, similar to what currently exists. The most practical installation for this type of system would likely be to install the piles in predrilled borings to obtain a sufficient embedment into the formational sandstone materials to resist lateral and moment forces acting on the piles. The void space between the piles and predrilled hole could be grouted to achieve suitable contact between the pile elements and the formational materials within the predrilled borings. We are available to provide LPILE computer modeling parameters for the formational materials and potential overlying streambed fill materials at your request in order to model lateral forces and moments acting on the piles.
- Soilnail/micropile elements could be installed to help brace the existing piles that support the crib wall depending on whether or not the existing pile sections are adequate to support the lateral loads that act on the wall. It may be possible to couple these new anchor elements to the existing piles to provide additional lateral bracing. If this option is pursued we recommend that further information regarding the depth of embedment of the existing piles be obtained.

5.2 *Geotechnical Design Parameters for New Diversion Structure Design*

This section of the report provides geotechnical engineering parameters that may be used to assist in the design for new structure(s) associated with the project.

5.2.1 Spread Footings

Conventional spread footings that are supported by the formational sandstone materials are a viable option for new structure design. Due to the potential for scour of the streambed aggregate materials, and the relatively shallow depth of the formational materials below the streambed, we recommend that spread footings extend to bear on the formational sandstone materials, or possibly within the formational sandstone materials depending on the results of scour analysis studies that will be performed by others on the project design team.

The formational sandstone materials exhibit compressive strengths equal to or greater than that of most concrete that is placed for foundation components. In reality the concrete will likely be the critical strength component regarding foundation bearing capacity values (as long as the foundation concrete extends to the clean and competent formational sandstone materials). For initial project design purposes an allowable bearing capacity value of 7,500 pounds per square foot may be used for footings supported directly over the clean competent formational materials. It is certainly possible to increase this allowable bearing capacity value if needed depending on the situation being analyzed. Please contact us if it is desired to utilize higher allowable bearing capacity values for the project. A coefficient of friction of 0.60 may be used for footing concrete placed directly over the competent formational sandstone materials. Post construction consolidation for footings placed directly on the competent formational materials will be less than ½ inch. The information provided in Section 5.2.2 may be used for grouted or epoxy

bonded dowels installed within the formational materials.

We are available to provide design recommendations for alternative foundation concepts such as drilled caissons or micro-piles at your request. Please contact us if additional information regarding alternative foundation systems are needed.

5.2.2 Capacities for Grouted Rock Anchors

We anticipate that the project may include the use of rock anchors for anchoring new foundation components to the underlying formational materials. The information provided below is applicable for the competent formational sandstone materials that underlie the stream channel.

- An estimated allowable bond capacity of 25 kips per square foot (175 psi) of bonded circumference area may be used. We recommend that a number of the rock anchors that are installed be proof tested in order to verify that the capacity provided above is appropriate. We are available to assist with the testing of rock anchors for the project.
- The allowable capacities provided above are appropriate for rock anchors that are spaced at least 6 boring diameters from one another. We should be contacted if rock anchors will be placed closer than 6 boring diameters from one another.
- The upper 12 inches of embedment into the formational sandstone material or the calculated maximum scour depth into the formational materials, whichever is greater, should be discounted from the design capacity of the anchors.
- The anchors may be bonded with conventional grout or an epoxy type bonding agent. For conventionally grouted anchors we recommend that a Type II Portland cement be used. The grout should achieve an unconfined compressive strength of at least 4,000 pounds per square inch at 7 days. Additional compressive strength characteristics of cement grout may be required by the project structural engineer. The manufacturer recommendation should be followed for proprietary epoxy bonding agents.
- The rock anchor borings should be thoroughly cleaned of loose debris and rock dust prior to the construction of the anchors. If possible, we recommend that a percussive type drill be used to create the rock anchor borings as this will likely provide a rougher bond surface for increased frictional capacity.
- Centralizers should be used to verify that the steel reinforcement is bonded in the center of the boring.

5.2.3 Lateral Earth Pressure Values for the Streambed Aggregate Materials

We have provided lateral earth pressure values that may be used for the project design. We have provided values for both saturated and unsaturated conditions. These values do not include surcharge loads, forces due to retained water above the backfill materials, or forces due to water flow. The project hydrologist or structural engineer will need to analyze the potential forces that may develop on the project structure(s) due to water flow at various runoff events. The passive resisting forces tabulated below should not be used for the project design unless a design is developed to ensure that post construction loss of the backfill materials (scour) does not occur in the future. As previously discussed, we noted that significant loss of the streambed materials against the downstream side of the existing structure has occurred in the past.

We were not able to perform direct shear strength tests for the existing alluvial materials upstream of the existing diversion structure due to the relatively large size and of the particles. It should be noted that the lateral earth pressure values tabulated below are not applicable for large cobble or boulder sized materials. We should be contacted if large cobble or boulder sized materials will be used for retaining wall backfill as this type of material will act more as a gravity wall type system.

Non-Saturated Lateral Earth Pressure Values

Type of Lateral Earth Pressure	Non-Saturated Level Native Granular Soil Backfill (pounds per cubic foot/foot)
Active	30
At-rest	50
Passive	525

Saturated Lateral Earth Pressure Values (below water table)

Type of Lateral Earth Pressure	Saturated Level Native Granular Soil Backfill (pounds per cubic foot/foot)
Active	77
At-rest	85
Passive	325

5.2.4 Stacked Boulder Walls and/or Stacked Boulder Streambed Slope/Fish Ladder Structures

The use of stacked boulder sized materials to construct walls or cascading fish ladder structures is likely a viable design alternative for the project. The engineering analysis for these types of structures will likely involve a combination of hydraulic scour calculations to properly size the boulders within the system, and gravity wall design analysis (static analysis of the gravity wall

system in relation to lateral forces acting on the wall, including forces due to water flow). The base boulders within the system should extend below the anticipated depth of scour within the streambed.

The engineering characteristics of stacked boulder retention type system is difficult to analyze and predict, as the effectiveness of the system is highly dependent on numerous variables. Some of these variables include;

- The geometry and other characteristics of the individual boulders within the system,
- The experience of the contractor placing the boulders within the system, and,
- Expected forces due to future water flow events within the streambed.

The structural integrity of the system may be greatly improved by incorporating anchors such as the installation of micropile elements through the individual boulders and into the formational materials that underlie the streambed. The effectiveness of grouted type anchors will be influenced by the potential loss of grout due to water flow within the streambed (surface and subsurface) as discussed in Section 5.2.5 below.

5.2.5 Concepts for Stabilizing Streambed Materials

As previously discussed, we observed that significant loss of the streambed particles below (downstream) of the existing structure has occurred as a significant pool exists immediately below the structure. From an engineering perspective, this loss of material reduces the passive pressures acting against the existing diversion wall. Potential future rockery type structures or cascading rock structures will also be prone to scour if they are not properly designed to withstand future heavy water flow events. We have discussed two concepts that may be considered to help decrease the potential for loss of the streambed materials below the structure. These concepts are discussed below.

- As discussed in Section 5.2.4 above, one strategy to help reduce the loss of streambed materials is to use sufficiently sized boulder materials that can withstand the forces of potential heavy water flow events. It may be possible to utilize micropile/soil nail anchors to help anchor the individual boulders. The project hydrologist should be consulted to help calculate the boulder size and density that will be required to resist movement from the maximum anticipated water flow velocity. It is preferable to use relatively high density and sound igneous or metamorphic type boulders for this purpose, however sound high density sandstone may also be acceptable. We are available to perform laboratory testing to help characterize the durability of potential boulder sources.
- A variation of the method discussed above is to attempt to use grout injection, potentially in conjunction with micropile type anchors to help stabilize smaller particle sizes such as the existing streambed gravels, cobbles and small boulders. With this method the concept would be to attempt to “glue” individual particles together without necessarily

directly penetrating and directly anchoring the individual particles as discussed above. The effectiveness of this concept will be directly related to the loss of grout that occurs due to water flow (surface and subsurface) within the streambed during the grout application process. We anticipate that it may be very difficult to obtain a good grout bond between individual particles due to grout loss during the grouting operation. If this type of stabilization system will be pursued we recommend that a trial test be performed to verify that sufficient grout is retained and cured within the gravel/cobble/boulder materials to be effective.

6.0 CONSTRUCTION CONSIDERATIONS

This section of the report provides comments, considerations and recommendations for aspects of the site construction which may influence, or be influenced by the geotechnical engineering considerations discussed above. The information presented below is not intended to discuss all aspects of the site construction conditions and considerations that may be encountered as the project progresses. If any questions arise as a result of our recommendations presented above, or if unexpected subsurface conditions are encountered during construction we should be contacted immediately.

6.1 *Fill Placement Recommendations*

There are several references throughout this report regarding both natural soil and compacted structural fill recommendations. The recommendations presented below are appropriate for the fill placement considerations discussed throughout the report above.

All areas to receive fill, structural components, or other site improvements should be properly prepared and grubbed at the initiation of the project construction. The grubbing operations should include scarification and removal of organic material and soil. No fill material or concrete should be placed in areas where existing vegetation or fill material exist.

We suspect that man-placed fill and subterranean structures may be encountered at some locations of the project. All existing fill material should be removed from areas planned for support of structural components. Excavated areas and subterranean voids should be backfilled with properly compacted fill material as discussed below.

6.1.1 *Natural Soil Fill*

Any natural soil used for any fill purpose should be free of all deleterious material, such as organic material and construction debris. Natural soil fill includes excavated and replaced material or in-place scarified material.

In areas of the project where finer clay type materials are used for fill (in areas outside the active stream channel), the soils should be moisture conditioned, either by addition of water to dry soils, or by processing to allow drying of wet soils. The proposed fill materials should be moisture conditioned to between about optimum and about 2 percent above optimum soil moisture content. This moisture content can be estimated in the field by squeezing a sample of the soil in the palm of the hand. If the material easily makes a cast of soil which remains in-tact, and a minor amount of surface moisture develops on the cast, the material is close to the desired moisture content. Material testing during construction is the best means to assess the soil moisture content.

Moisture conditioning of clay or silt soils may require many hours of processing. If possible, water should be added and thoroughly mixed into fine grained soil such as clay or silt the day prior to use of the material. This technique will allow for development of a more uniform moisture content and will allow for better compaction of the moisture conditioned materials.

The moisture conditioned soil should be placed in lifts that do not exceed the capabilities of the compaction equipment used and compacted to at least 90 percent of maximum dry density as defined by ASTM D1557, modified Proctor test. We typically recommend a maximum fill lift thickness of 6 inches for hand operated equipment and 8 to 10 inches for larger equipment. Care should be exercised in placement of utility trench backfill so that the compaction operations do not damage the underlying utilities.

The streambed particles generally consist of relatively clean aggregate. We anticipate that there may be areas of the project where the natural streambed particles are used for structural fill or wall backfill. If used, the materials should be screened to approximate 4-inch minus and compacted with vibratory equipment such as large plate type compactors. The appropriate lift thickness will be dependent on the particle sizes within the material, and type of compaction equipment being used, but in general should not exceed about 8 to 12 inches.

Larger natural materials such as cobble and boulder sized materials may also be used as backfill depending on the application. Proper densification/stability of these larger sized materials will primarily dependent on the proper placement of the individual particles relative to one another. The individual particles will need to be placed such that adequate contact is made between adjacent particles to create a stable fill mass.

6.1.2 *Granular Imported Compacted Structural Fill (if used)*

Many products other than road base, such as clean aggregate or select crusher fines may be suitable, depending on the intended use. If a specification is needed by the design professional for development of project specifications, a material conforming to the Colorado Department of Transportation (CDOT) “Class 6” aggregate road base material can be specified. This specification can include an option for testing and approval in the event the contractor’s desired

material does not conform to the Class 6 aggregate specifications. We have provided the CDOT Specifications for Class 6 material below

Grading of CDOT Class 6 Aggregate Base-Course Material	
Sieve Size	Percent Passing Each Sieve
¾ inch	100
#4	30 – 65
#8	25 – 55
#200	3 – 12

Liquid Limit less than 30

All compacted structural fill should be moisture conditioned and compacted to at least 90 percent of maximum dry density as defined by ASTM D1557, modified Proctor test.

6.2 *Excavation Considerations*

Unless a specific classification is performed, the site soils should be considered as an Occupational Safety and Health Administration (OSHA) Type C soil and should be sloped and/or benched according to the current OSHA regulations. Excavations should be sloped and benched to prevent wall collapse. Any soil can release suddenly and cave unexpectedly from excavation walls, particularly if the soils is very moist, or if fractures within the soil are present. Daily observations of the excavations should be conducted by OSHA competent site personnel to assess safety considerations.

We encountered subsurface water in our test borings. We anticipate that water will be encountered within the project excavations. Provisions will need to be made for dewatering the project excavations where necessary.

We encountered formational material in our test borings. We suspect that it may be difficult to excavate this material using conventional techniques. If blasting is planned it must be conducted strategically to reduce the effect of the blasting on the support characteristics of the site materials and the stability of adjacent slopes. We typically recommend that where possible blasting be avoided, however blasting is often needed to aid in the excavation of the site. It is typical to have about 2 to 3 feet of loose angular clasts of rock, commonly called “shot-rock” below the desired bottom of excavation elevations. This material is not suitable for support of structural components and should be removed and replaced with more stable fill materials for support of structural components.

6.2.1 *Excavation Cut Slopes*

Excavation cut slopes will need to be analyzed on a case by case basis due to the uncohesive nature of the streambed materials and potential water flow within the excavations. We should be contacted to further assess proposed excavation cut slopes during the project design progression.

7.0 CONSTRUCTION MONITORING AND TESTING

Construction monitoring including engineering observations and materials testing during construction is a critical aspect of the geotechnical engineering contribution to any project. Unexpected subsurface conditions are often encountered during construction. The site foundation excavations should be observed by the geotechnical engineer or a representative during the early stages of the site construction to verify that the actual subsurface soil and water conditions were properly characterized as part of field exploration, laboratory testing and engineering analysis. If the subsurface conditions encountered during construction are different than those that were the basis of the geotechnical engineering report then modifications to the design may be implemented prior to placement of fill materials or foundation concrete.

Compaction testing of fill material should be performed throughout the project construction so that the engineer and contractor may monitor the quality of the fill placement techniques being used at the site. Generally, we recommend that compaction testing be performed for any fill material that is placed as part of the site development. Compaction tests should be performed on each lift of material placed in areas proposed for support of structural components. In addition to compaction testing we recommend that the grain size distribution, clay content and swell potential be evaluated for any imported materials that are planned for use on the site. Concrete tests should be performed on foundation concrete and flatwork. We are available to develop a testing program for soil, aggregate materials, concrete and asphaltic concrete for this project.

8.0 CONCLUSIONS AND CONSIDERATIONS

The information presented in this report is based on our understanding of the proposed construction that was provided to us and on the data obtained from our field and laboratory studies. We recommend that we be contacted during the design and construction phase of this project to aid in the implementation of our recommendations. Please contact us immediately if you have any questions, or if any of the information presented above is not appropriate for the proposed site construction.

PN: 55335GE
September 14, 2018

The recommendations presented above are intended to be used only for this project site and the proposed construction which was provided to us. The recommendations presented above are not suitable for adjacent project sites, or for proposed construction that is different than that outlined for this study.

Our recommendations are based on limited field and laboratory sampling and testing. Unexpected subsurface conditions encountered during construction may alter our recommendations. We should be contacted during construction to observe the exposed subsurface soil conditions to provide comments and verification of our recommendations.

We are available to review and tailor our recommendations as the project progresses and additional information which may influence our recommendations becomes available.

Please contact us if you have any questions, or if we may be of additional service.

Respectfully submitted,
TRAUTNER GEOTECH

Jonathan P. Butler, P.E.
Staff Geotechnical Engineer

APPENDIX A

Logs of Test Borings

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Hole Diameter	: 2 inch
Drilling Method	: NWL wireline
Sampling Method	: Core
Date Drilled	: 8/8/2018
Total Depth	: 3 feet
Location	: See Figure
Elevation	: Streambed

LOG OF BORING TC-1

Florida Canal Diversion Rehabilitation
Durango, Colorado
Mr. Hayes Lenhart, P.E.
Wright Water Engineers, Inc.

PN: 55335GE

Bag Sample
Core Run
Standard Split Spoon

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Core Run	Run	Water Level	RECOVERY, R.Q.D.
0	COBBLES, GRAVEL, sandy, dense, very moist to wet, brown	GP			Run One	▽	Run One 0 feet to 3 feet Recovery=56% R.Q.D.=N/A
3	Stop coring at 3 feet due to cuttings in river						
5							

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Hole Diameter	: 2 inch
Drilling Method	: NWL wireline
Sampling Method	: Core
Date Drilled	: 8/8/2018
Total Depth	: 20 feet
Location	: See Figure
Elevation	: ~3 feet above streambed

LOG OF BORING TC-1A

Florida Canal Diversion Rehabilitation
Durango, Colorado
Mr. Hayes Lenhart, P.E.
Wright Water Engineers, Inc.

PN: 55335GE

Bag Sample
Core Run
Standard Split Spoon

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Core Run	Run	Water Level	RECOVERY, R.Q.D.
0–1	SILT, sandy, medium stiff, slightly moist, brown	ML					
1–8	GRAVEL, SAND, silty, cobbles, dense to very dense, moist, brown	GM			Run One Run Two	▽	Run One 0 feet to 5 feet Recovery=35% R.Q.D.=N/A Run Two 5 feet to 8 feet Recovery=43% R.Q.D.=N/A
8–10	POINT LOOKOUT SANDSTONE FORMATION at 8 feet, Massive part, Sandy Shale, very hard, moderate fractures, gray	Formation			Run Two		Run Two 8 feet to 10 feet Recovery=100% R.Q.D.=80%
10–15	Shaley Sandstone to Sandy Shale, very hard, moderate to light fracturing,	Formation			Run Three		Run Three 10 feet to 15 feet Recovery=100% R.Q.D.=90%
15–17	Highly fractured Shale/Claystone, some coal, gray	Formation					
17–20	Sandstone, very hard, low fracturing, gray	Formation			Run Four		Run Four 15 feet to 20 feet Recovery=88% R.Q.D.=80%
20	Bottom of test boring at 20 feet						

TRAUTNER GEOTECH LLC

Field Engineer	: J. Butler
Hole Diameter	: 3.25 inch I.D. Hollow
Drilling Method	: Continuous Flight Auger
Sampling Method	: Bag Sample
Date Drilled	: 8/8/2018
Total Depth (approx.)	: 8 feet
Location	: See Figure
Elevation	: Streambed

LOG OF BORING TB-2

Florida Canal Diversion Rehabilitation
Durango, Colorado
Mr. Hayes Lenhart, P.E.
Wright Water Engineers Inc.

Project Number: 55335GE

Sample Type
- Mod. California Sampler
- Bag Sample
- Standard Split Spoon

Water Level
- Water Level During Drilling
- Water Level After Drilling

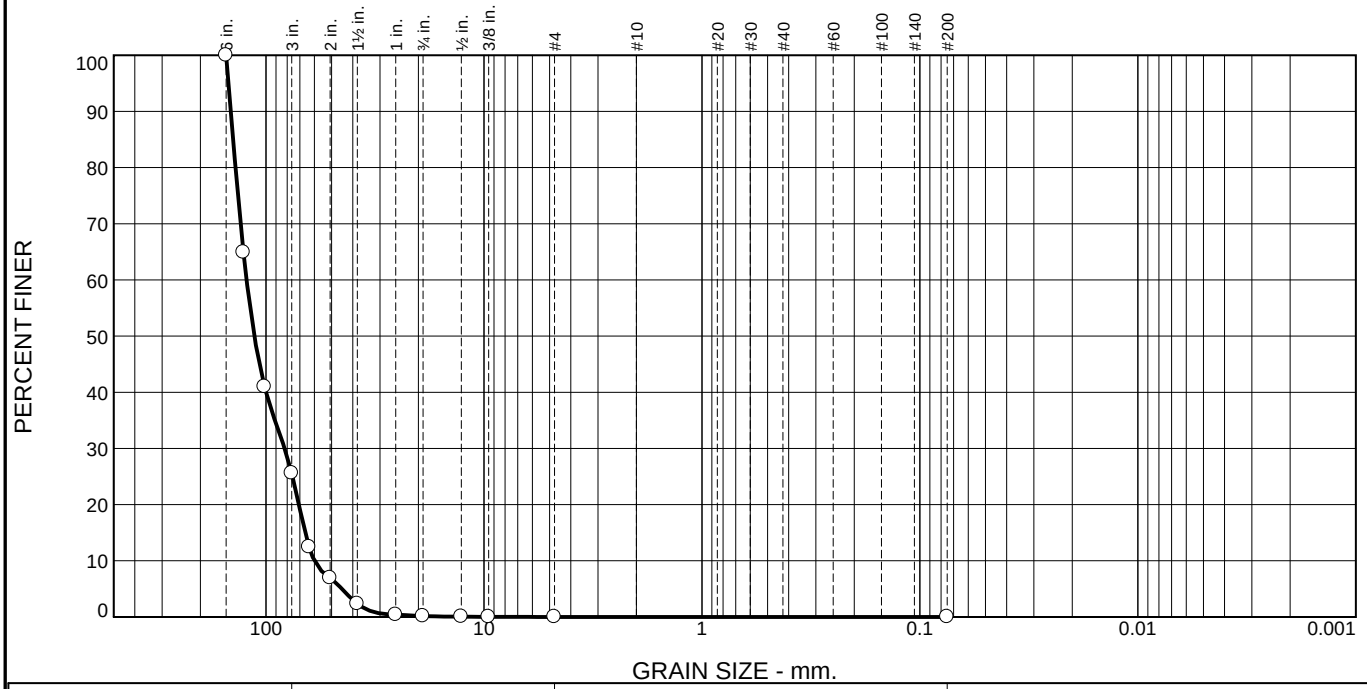
Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	GRAVEL, COBBLES, sandy, very dense, wet, brown	GP				▽	
5	POINT LOOKOUT SANDSTONE FORMATION a 5 feet, Massive part, Sandstone, very hard, moist to slightly moist, white	Formation					
8	Auger refusal at 8 feet						
10							

APPENDIX B

Laboratory Test Result

D_{50} Sieve Analyses

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
74.4	25.4	0.2	0.0	0.0	0.0	0.0	0.0

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
6	100.0		
5	64.9		
4	41.0		
3	25.6		
2.5	12.4		
2	7.0		
1.5	2.3		
1	0.4		
.75	0.2		
.5	0.0		
.375	0.0		
#4	0.0		
#200	0.0		

* (no specification provided)

Material Description

Boulders, Cobbles, and Gravel

Atterberg Limits (ASTM D 4318)

PL= N/A **LL=** N/A **PI=** N/A

Classification

USCS (D 2487)= GP **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 145.2537 D_{85}= 141.7329 D_{60}= 122.9118
D_{50}= 113.1967 D_{30}= 82.0931 D_{15}= 66.1626
D_{10}= 60.0362 C_u= 2.05 C_c= 0.91

Remarks

Date Received: 8/14/18 **Date Tested:** 8/17/18

Tested By: R. Barrett

Checked By: J. Butler

Title: P.E.

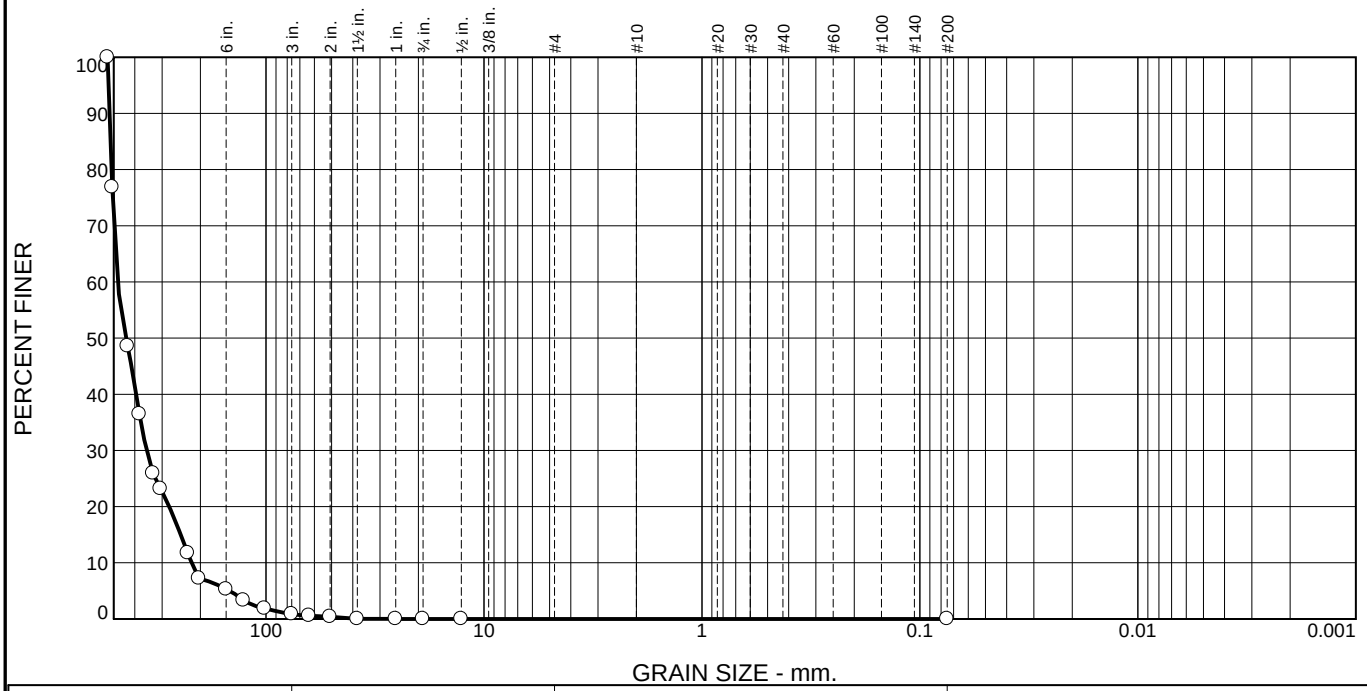
Location: Upstream of Diversion **Date Sampled:** 8/14/18
Sample Number: C10183-C **Depth:** Streambed

TRAUTNER GEOTECH LLC

Client: Mr. Hayes Lenhart, P.E., Wright Water Engineers, Inc.
Project: Florida Ditch Diversion Rehabilitation, Durango, CO

Project No: 55335GE **Figure: 4.1**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
99.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
21	100.0		
20	76.9		
17	48.6		
15	36.5		
13	25.9		
12	23.2		
9	11.7		
8	7.2		
6	5.3		
5	3.3		
4	1.9		
3	0.9		
2.5	0.6		
2	0.4		
1.5	0.0		
1	0.0		
.75	0.0		
.5	0.0		
#200	0.0		

* (no specification provided)

Material Description

Boulders, Cobbles, and Gravel

Atterberg Limits (ASTM D 4318)

PL= N/A **LL=** N/A **PI=** N/A

Classification

USCS (D 2487)= GP **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 522.9208 D_{85}= 517.5131 D_{60}= 479.1701
D_{50}= 439.7761 D_{30}= 353.2844 D_{15}= 246.1905
D_{10}= 219.5823 C_u= 2.18 C_c= 1.19

Remarks

Date Received: 8/14/18 **Date Tested:** 8/17/18

Tested By: R. Barrett

Checked By: J. Butler

Title: P.E.

Location: Downstream of Diversion **Date Sampled:** 8/14/18
Sample Number: C10183-d **Depth:** Streambed

TRAUTNER GEOTECH LLC

Client: Mr. Hayes Lenhart, P.E., Wright Water Engineers, Inc.
Project: Florida Ditch Diversion Rehabilitation, Durango, CO

Project No: 55335GE **Figure: 4.2**

Appendix C

Sponsor Creditworthiness Documents

C-1

Current Rates and Assessments

Appendix C-1
Current Schedule of Assessments
Florida Consolidated Ditch Company

Shareholders	Shares	Assessment per Share	O&M per share
293	6,200	$40.30	$70.00

Source: Correspondence with FCDC personnel 4/6/2020

C-2

Summary Balance Sheet

Florida Consolidated Ditch Company
Summary Balance Sheet
Cash Basis — As of December 31, 2019

	Dec 31, 19
ASSETS	
Current Assets	
Checking/Savings	106,392.74
Accounts Receivable	-23,076.22
Other Current Assets	1,138.20
Total Current Assets	84,454.72
Fixed Assets	68,947.14
Other Assets	14,637.92
TOTAL ASSETS	**168,039.78**
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	-1,352.06
Other Current Liabilities	-16,471.95
Total Current Liabilities	-17,824.01
Total Liabilities	-17,824.01
Equity	185,863.79
TOTAL LIABILITIES & EQUITY	**168,039.78**

Florida Consolidated Ditch Company
Summary Balance Sheet
Cash Basis — As of December 31, 2018

	Dec 31, 18
ASSETS	
Current Assets	
Checking/Savings	210,622.28
Accounts Receivable	-23,316.72
Other Current Assets	1,138.20
Total Current Assets	188,443.76
Fixed Assets	68,947.14
Other Assets	14,637.92
TOTAL ASSETS	272,028.82
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	-1,302.05
Other Current Liabilities	-13,539.79
Total Current Liabilities	-14,841.84
Total Liabilities	-14,841.84
Equity	286,870.66
TOTAL LIABILITIES & EQUITY	272,028.82

Florida Consolidated Ditch Company
Summary Balance Sheet
Cash Basis — As of December 31, 2017

	Dec 31, 17
ASSETS	
Current Assets	
Checking/Savings	139,793.38
Accounts Receivable	-435.05
Other Current Assets	50,301.68
Total Current Assets	189,660.01
Fixed Assets	68,947.14
Other Assets	14,637.92
TOTAL ASSETS	**273,245.07**
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	-514.54
Other Current Liabilities	-15,247.91
Total Current Liabilities	-15,762.45
Total Liabilities	-15,762.45
Equity	289,007.52
TOTAL LIABILITIES & EQUITY	**273,245.07**

Appendix D

CWCB Water Loan Program Signed Application

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Water Project Loan Program

Projects financed by the Water Project Loan Program must align with the goals identified in Colorado's Water Plan and its measurable objectives.

Application Type

☐ Prequalification *(Attach 3 years of financial statements)* ☑ Loan Approval *(Attach Loan Feasibility Study)*

Agency/Company Information

Company / Borrower Name: Florida Consolidated Ditch Company

Authorized Agent &Title: Roger Cole, Florida Consolidated Ditch Company Board President

Address: P.O. Box 2138, Durango, Colorado, 81302

Phone: (970)749-9800 | Email: floridaditch@gmail.com

Organization Type: ☑ Ditch Co, ☐ District, ☐ Municipality ☐ other: _____ | Incorporated? ☑ YES ☐ NO

County: La Plata | Number of Shares/Taps: 6,200

Water District: Florida Water Conservancy District | Avg. Water Diverted/Yr 10,254 acre-feet

Number of Shareholders/Customers Served: | Current Assessment per Share $40.30 (Ditch Co)

Federal ID Number: 84-0204321 | Average monthly water bill $ _____ (Municipality)

Contact Information

Project Representative: Wright Water Engineers Inc. - Peter Foster

Phone: (970) 259-7411 | Email: pfoster@wrightwater.com

Engineer: Wright Water Engineers Inc. - Peter Foster

Phone: (970) 259-7411 | Email: pfoster@wrightwater.com

Attorney: Nancy Agro

Phone: (970) 422-2024 | Email: agro@mydurango.net

Project Information

Project Name: Florida Canal Diversion Structure Rehabilitation Project

Brief Description of Project: (Attach separate sheets if needed)

See Attached Description

Project Start Date(s) Design: January , 2022 Construction: October, 2022

General Location: (Attach Map of Area)

6.5 miles northeast of Durango, CO

Project Costs - Round to the nearest thousand

Estimated Engineering Costs: $268,000 | Estimated Construction Costs: $932,000

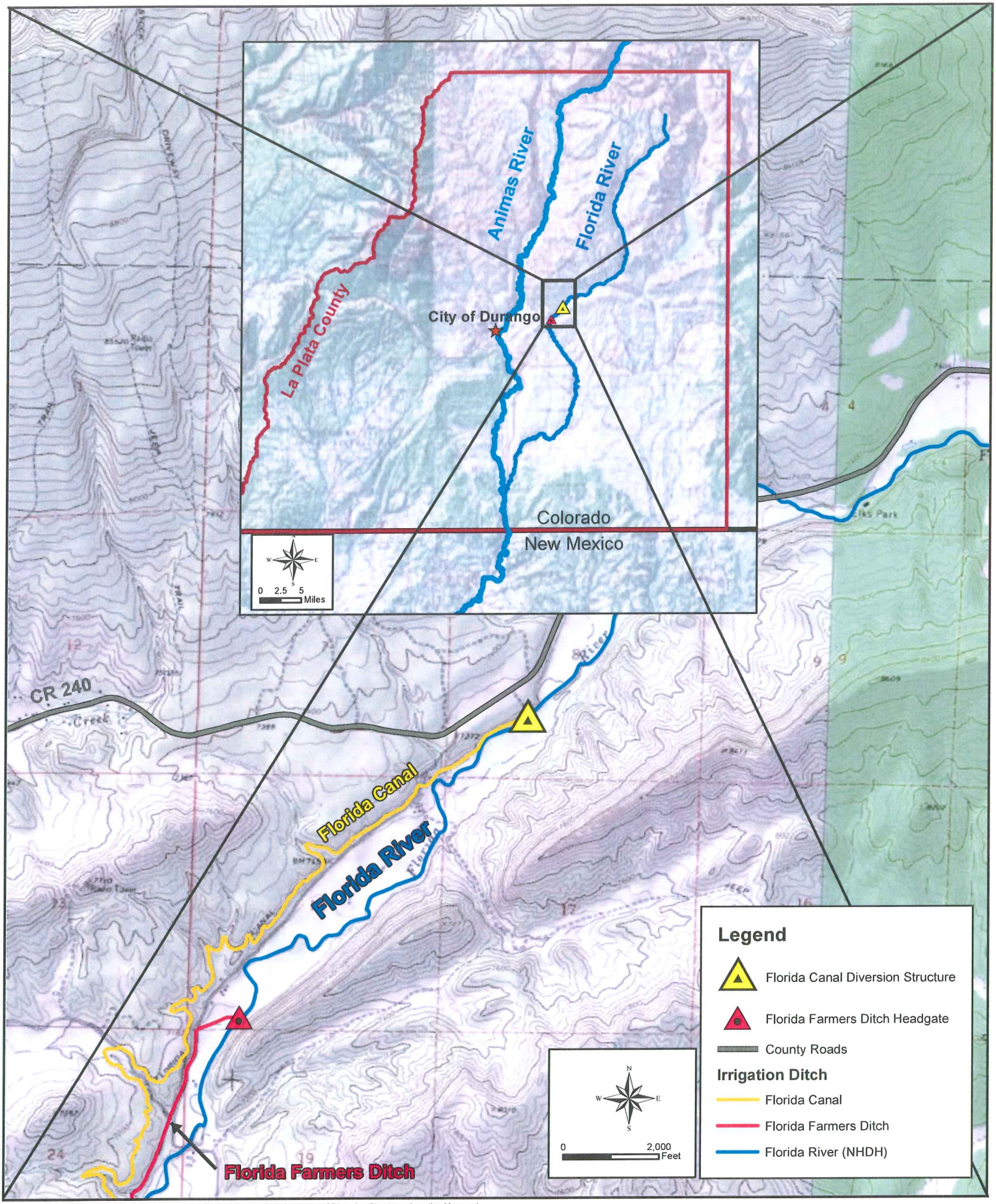
Other Costs (Describe Above): | Estimated Total Project Costs: 1,200,000

Requested Loan Amount: $1,025,000 | Requested Loan Term(10, 20, or 30 years): 30 Years

Signature

J. Roger Cole / Board president 7-22-2020
Signature / Title Date

Return to: Finance Section Attn: Matt Stearns
1313 Sherman St #718
Denver, CO 80203
Ph. 303/866.3441
e-mail: matthew.stearns@state.co.us



Document Path: P:\061-110\140 Florida Canal Diversion Dam\05 Mapping\Florida Canal Diversion Structure - Location Map.mxd

WWE
Wright Water Engineers, Inc.
1666 N. Main Ave., Ste.C
Durango, CO 81301
(970) 259-7411 ph 259-8758 fx

LA PLATA COUNTY, CO

FLORIDA CANAL DIVERSION STRUCTURE - LOCATION MAP

FLORIDA CONSOLIDATED DITCH COMPANY

PROJECT NO. 061-110.140

FIGURE 1

Florida Consolidated Ditch Company - Florida Canal Diversion Structure Rehabilitation Project
Phase 2 – Water Project Loan Program Application Project Description

Phase 2 of the Florida Canal Rehabilitation Project (the Project) includes the final engineering design, environmental, services during bidding, construction, and engineering services during construction for repairs to the Florida Canal Diversion Structure (Diversion Structure). Phase 1 of the Project, consisting of preliminary design concepts and development of a CWCB loan feasibility study is complete, and the Florida Consolidated Ditch Company (FCDC) is ready to secure additional funding for Phase 2 construction of the Project.

The Diversion Structure delivers pre-Compact irrigation water rights to the Florida Canal headgate for irrigation of approximately 6,400 acres on the Florida Mesa. The current Diversion Structure is a low head dam that impedes upstream fish and aquatic organism passage. Phase 1 of the project explored conceptual design alternatives to incorporate multi-purpose components into the rehabilitation of the Diversion Structure including:

- Provide a more reliable Diversion Structure to protect pre-compact water rights decreed for irrigation.
- Reduce drowning hazard potential and increase river safety.
- Provide a more reliable source of water for Pastorius Reservoir, a CPW State Wildlife Area.
- Enhance the aquatic habitat in the natural stream corridor by promoting fish passage and aquatic connectivity.
- Reduce the amount of sediment and debris entering the canal to reduce operations and maintenance costs and disturbances to the river from these activities.

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