Feasibility Study for The Dixon Canon Ditch and Reservoir Company Dixon Reservoir Dam Improvement Project Water Division 1 Water District 3 DAMID 030124

Sponsored by the
Dixon Canon Ditch and Reservoir Company
In Conjunction with the
Colorado Water Conservation Board

Prepared by
Gauthiere Engineering, Inc.
2157 Buena Vista Drive
Greeley, Colorado

March 30, 2016

FEASIBILITY STUDY APPROVAL
Pursuant to Colorado Revised Statutes 37-60-121 &122, and in accordance with policies adopted by the Board, the CWCB staff has determined this Feasibility Study meets all applicable requirements for approval.

Signed

5/6/16
Date

Certificate of Engineer

I, John G. Gauthiere, P.E., a Registered Professional Engineer in the State of Colorado, hereby certify that the information presented in this Feasibility Study for the Dixon Canon Ditch and Reservoir Company – Dixon Reservoir Dam Improvement Project was prepared by me or was prepared under my direct supervision for the owners thereof.

Gauthiere Engineering, Inc.

John G. Gauthiere March 30, 2016

John G. Gauthiere, P.E.
Colorado P.E. No. 22136

Table of Contents

List of Appendices

Dixon Canon Ditch and Reservoir Company

Mr. Doug Kokes, President
Mr. Paul Rupp, Vice President

Attorney for the Dixon Canon Ditch and Reservoir Company

Mr. Brent A. Bartlett, Fisher, Brown, Bartlett and Gunn
1319 E. Prospect Road
Fort Collins, Colorado 80525
970 407 9000 x 217

Engineering and Technical Support

John G. Gauthiere, P.E.
Gauthiere Engineering, Inc.
2157 Buena Vista Drive
Greeley, Colorado 80634
970 330 0855

Acknowledgements

Gauthiere Engineering, Inc. would like to thank the Dixon Canon Ditch and Reservoir Company for the valuable assistance during the preparation of this report. Special thanks are offered to the following individuals of the company and other organizations:

Doug Kokes, President
Paul Rupp, Vice President
Andy Piszkin, USDA-Natural Resources Conservation Service
Anna Maus, P.E., Colorado Water Conservation Board
Kallie E. Bauer, P.E. Dam Safety Engineer, Co. Div. of Water Resources

Introduction

The Dixon Canon Ditch and Reservoir Company (DCD&RCo.), located in Larimer County, Colorado operates the Dixon Reservoir Dam and associated ditch for the benefit of the shareholders by providing irrigation water. The canal diverts from Dixon Creek. The Dam is located on the West side of Fort Collins accessible from County Rd 42C approximately ¼ mile south of Hughes Stadium (See Location Map Figure 1). Water deliveries are made through the Company's ditch and pipeline to a 206-acre service area. The Company's structures are quite senior.

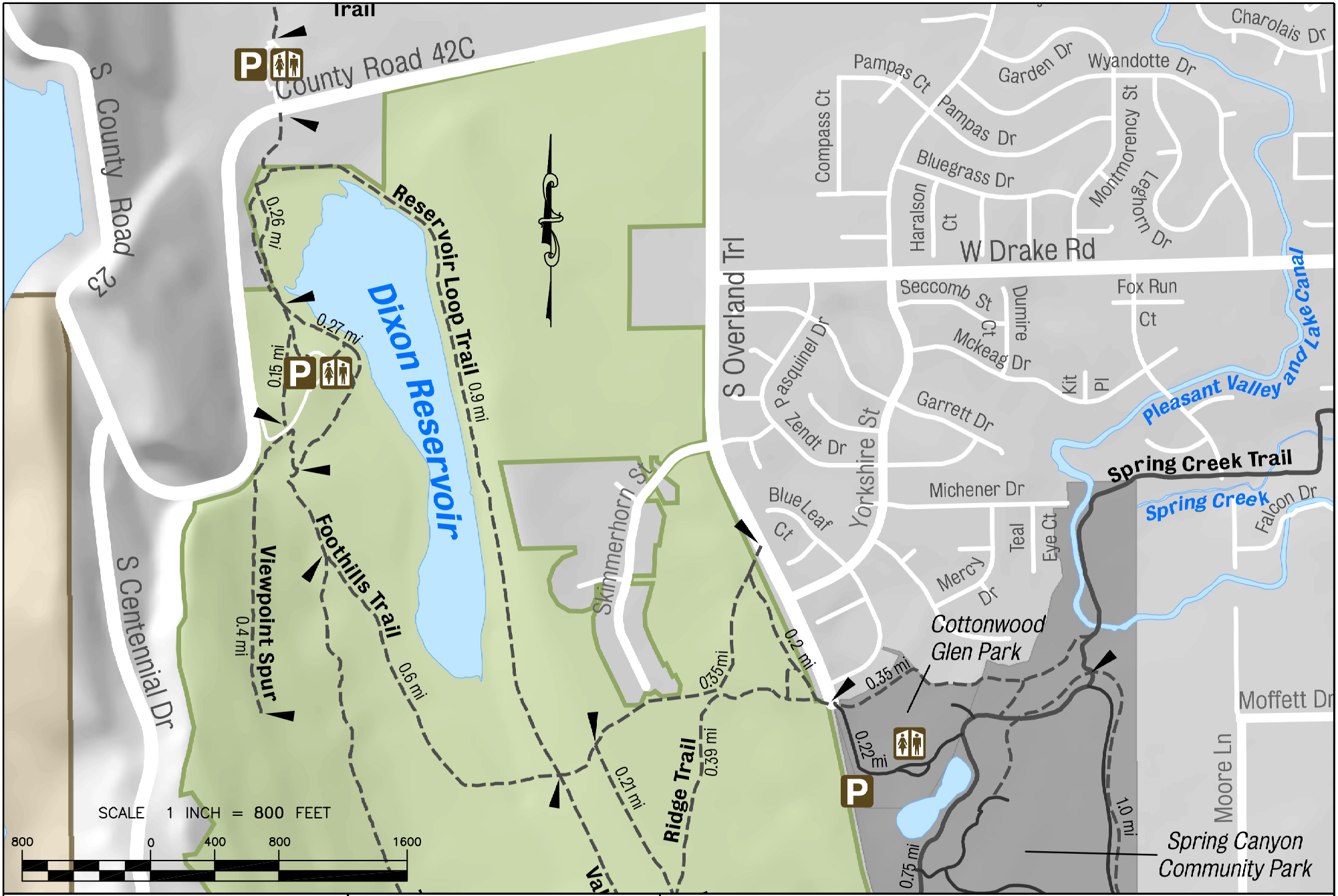
Dixon Reservoir Dam (DAMID 030124) was constructed in 1885 and is classified as a Significant Hazard Dam by the Dam Safety Branch of the Office of the State Engineer (SEO). The Dam is located in Larimer County, Division 1, Water District 3. The Dam normally impounds 335 acre-feet of water and is 975-feet in length.

Over the years, several maintenance projects were performed on the dam including tree removal and possible over-steepening of the upstream slope of the embankment between stations 4+50 and 5+50. During 1984, finger drains and concrete sand filters were install to alleviate adverse effects of seepage. The 12" clay tile outlet pipe was relined with 10-inch PVC pipe in 1974. The annular space between the existing tile pipe and the PVC liner pipe was reportedly grouted but some historical seepage along the outlet though the annulus has been reported. The outlet gate and trash rack were replaced fairly recently and are in good working order. The Project as defined by the Owner involves four major Priorities

Priority 1 - The November 14, 2011 and May 30 2013 SEO Dam Inspection Report identified locations of seepage that will need to be addressed. Locations of seepage noted were at Sta 6+50, Sta1+90 to 2+10 and Sta 3+20 to 4+50. The area within approximately 150' to the west of the dam outlet is the area of primary concern for seepage. The SEO suggests that an engineered drain that will filter and collect seepage in a controlled manner be designed and installed. The engineered drain should be equipped with a flow-measuring device to allow the quantity and quality of seepage to be monitored. Construction of Priority 1 Improvements is targeted to occur after mid-September 2016.

Priority 2 – Inspect and investigate Headgate and Dam Outlet condition and if necessary, prepare plans specifications and bidding documents for required work. If construction or implementation of Priority 2 Improvements is found to be necessary, then the work would be targeted for the spring (pre-season) 2016.

Priority 3 – Complete design, plans, specifications and bidding documents for NRCS recommended improvements (listed in Mr. Andy Piszkin's NRCS Report dated Sept 17, 2015) to the delivery system between Cleanout # 0 (exit end of 10-inch dam outlet pipe) and Cleanout #2.



GAUTHIERE ENGINEERING, INC. 2157 Buena Vista Drive Greeley, Colorado 80634 Phone: (970) 330-0855 E-mail: john@gauthiere-engineering.com	Scale: 1" =800'	DIXON CANON DITCH & RESERVOIR CO. PROJECT LOCATION MAP	
	Drawn By: JGG		
	File: DIXON	Date: MAR. 30, 2016	Figure 1

Priority 4 – Provide design, plans, specifications and bidding documents for replacement of manual air relief valves with automatic air relief valves to be located along the approximate 2350-feet of 12-inch pipe between the Spring Canyon division structure and the original irrigation ditch (TAWA receipt point).
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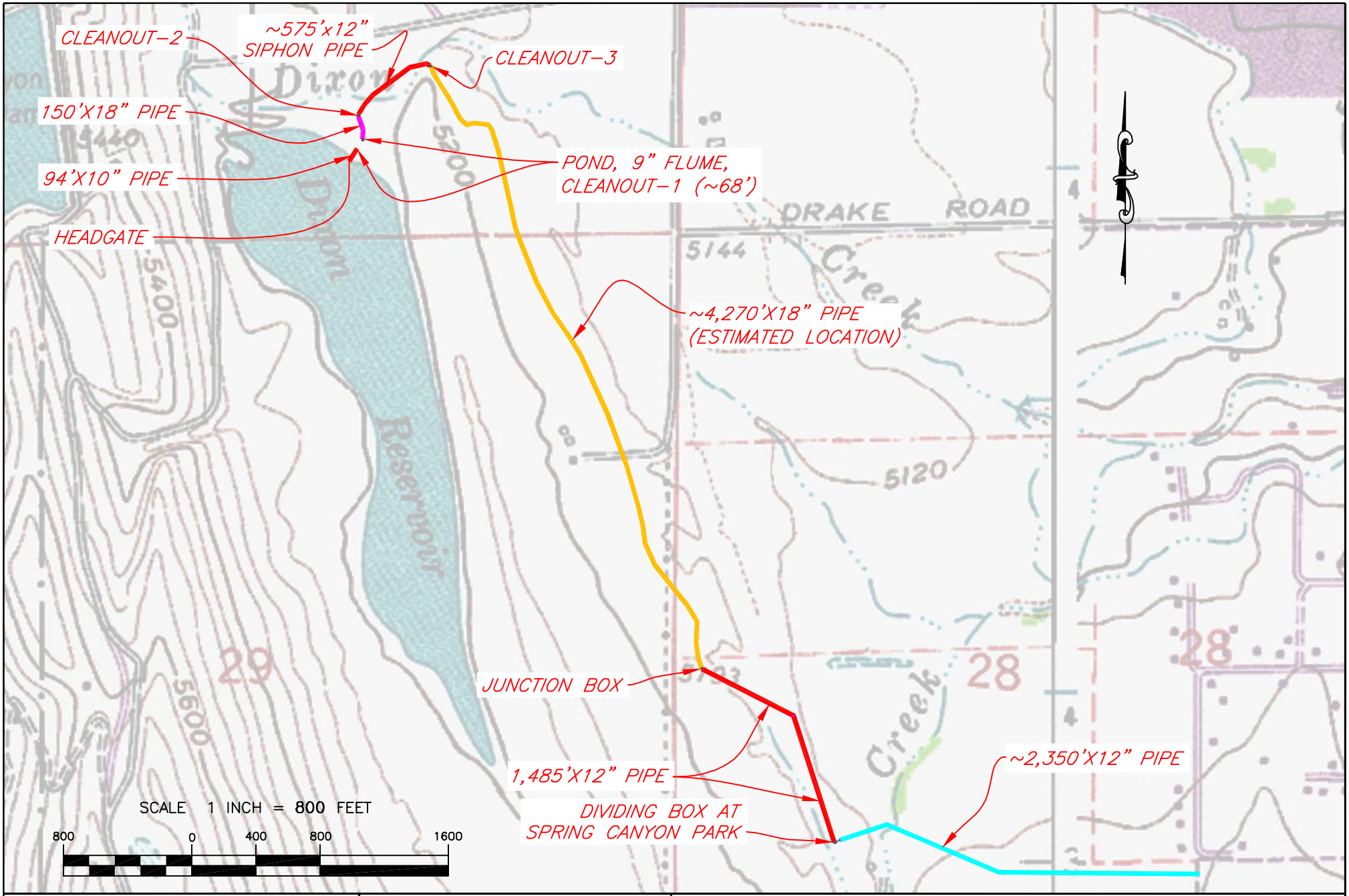
Project Sponsor

The Dixon Canon Ditch and Reservoir Company is a mutual ditch and reservoir company and a non-profit corporation registered in the State of Colorado. The Dixon Canon Ditch and Reservoir Company has continuously operated from the date of its incorporation on or about August 8, 1885, first as a dejure and then after January 1, 1983, as a defacto corporation. There are five shareholders including the City of Fort Collins and 1,000 shares of stock. (See Stockholders list - Appendix F.) The Dixon Canon Ditch and Reservoir Company has the power to set annual assessments to be paid by the shareholders, the power to cut off water deliveries to shareholders that fail to pay their assessments, and the power to offer stock for sale to pay back assessments. The Dixon Canon Ditch and Reservoir Company articles of incorporation and by-laws are included in Appendix A.

The Company's diversion dam and canal headgate facilities are located on the West edge of the City of Fort Collins on the East side of the Dixon Canyon Dam of Horsetooth Reservoir (see Project Location Map Figure 2). The facilities to be improved include the downstream face of the Company' s dam and outlet pipeline located in Sections 20 and 29, Township 7 North, Range 69 West of the Sixth Principal Meridian, Larimer County, Colorado (See Photographs of Existing Structures below:



GAUTHIERE ENGINEERING, INC.
2157 Buena Vista Drive Greeley, Colorado
80634 Phone: (970) 330-0855
E-mail: john@gauthiere-engineering.com

Scale: 1" =800'	DIXON CANON DITCH & RESERVOIR CO. PROJECT RESERVOIR AND DITCH LOCATION MAP
Drawn By: JGG	
File: DIXON	Date: MAR. 30, 2016

Figure 2

PHOTO 1 – EXISTING 975-FOOT EARTHEN DAM

PHOTO 2 – EXISTING TRASH RACK AND 12” DIA. HEADGATE

PHOTO 3 – SEEPAGE AREA LEFT OF OUTLET ON DOWNSTREAM SIDE OF DAM

PHOTO 4 – ACTIVE SEEPAGE LEFT OF THE DAM OUTLET

Project Service Area and Facilities

The Company service area is comprised of approximately 206 acres. The Company's peak diversions are averaging 312 acre-ft. per year from Dixon Creek. Water diversion rights owned by the company include an absolute decreed storage right of 469 acre-ft. The diversion of water is accomplished with a 975-ft. long dam across Dixon Creek and a headgate structure. See Photos 1 and 2. The existing structures were originally built in 1885 and have been repaired and improved over the last 131 years. The diverted water is delivered to the stockholders through approximately 8,994 feet of pipe and ditch. The water is typically used to irrigate turf, agricultural crops including a vineyard and the City of Fort Collins park and open space.

Hydrology and Water Rights Water Rights listed are for Dixon Canon Ditch and Reservoir Company - Not Pawnee Canal.

A review of the HydroBase files for the Pawnee Canal (Structure ID Number 3731) indicates that the water rights associated with this structure are as shown in Table 1 below:

Table 1

Appropriation Date	Absolute AF	Conditional AF
1885-10-08	448	0
1906-08-30	21	0
Totals	469	0

See Appendix B for the Structure Summary Report for a listing of all water rights data.

The annual average diversion for the Dixon Canon Ditch and Reservoir Company amounts to 312 acre-feet per year. This average is based on State of Colorado's HydroBase data for the years 1956 through 2010 (See Appendix B)

Considering the Company's available diversion rights, hydraulic design of the new piping will be based on a diversion capacity of not less than 2.6 cubic feet per second.

Project Description and Alternatives

The purpose of this project is to provide a means for the Company to continue providing an adequate amount of irrigation water to shareholders while minimizing the potential for the occurrence of future failure of the Dam. Three alternatives were considered:

1. The no-action alternative.

2. Alternate 2 involves the removal and reconstruction of approximately 180-feet of the 975-foot dam. This alternate would also provide for a new and larger outlet pipe. The estimated cost of this alternative is $975,000.

3. Alternate 3 involves the placement of a seepage filtration and collection blanket on the downstream face of the existing dam as shown in the attached preliminary construction plans. In addition to seepage control measures, the delivery of water to the stockholders will be improved by the construction of approximately 70 linear feet of 12-inch diameter pipe. New features to the delivery system will include metering improvements

and appropriate pipeline air release equipment. The estimated cost of this alternative is $309,000.

Alternate No. 1 was considered unacceptable because the stockholders continue to depend on the water for important uses including agriculture, aesthetics, wildlife habitat and park irrigation. Loss of the ability to store water in Dixon Reservoir would be a detriment to the quality of human life as well wildlife habitat in the area and would likely reduce property values.

The “no-action” alternate jeopardizes an important 448-acre-foot storage decree. The “no-action” alternative is not acceptable to The Dixon Canon Ditch and Reservoir Company.

Alternate No. 2 was ruled out due to the much greater cost without providing a concurrent greater benefit.

Alternate No. 3. was chosen because it provides a reasonable and sound solution to potential dam safety issues associated with seepage. The proposed two-stage seepage collection and filter blanket is a well-accepted and proven method of for addressing dam seepage problems and is a third of the cost of completely excavating approximately 180-foot of the existing dam and replacing the outlet.

The delivery piping improvements will allow all stockholders to receive the water they are entitled to. The delivery piping improvements will boost capacity to approximately 2.6 cfs.

The proposed closed conduit meter will replace the existing 9” Parshall Flume. The existing flume now operates in a partially submerged condition making it inaccurate and unreliable.

The estimated cost of Alternate No. 3 is shown below in Table 2:

TABLE 2

Item	Description	Qty.	Unit	Unit Price $	Amount $
1	Mobilization	1	LS	$14,680	$14,680
2	Control of Water & De-watering	1	LS	15,000	15,000
3	Demolition	1	LS	5,000	5,000
4	Strip and Stockpile Topsoil	370	CY	20	7,400
5	Excavation	1,500	CY	40	60,000
6	Structural Fill	100	CY	50	5,000
7	Filter Sand and Placement	300	CY	75	22,500
8	Gravel Drain and Placement	100	CY	60	6,000
9	6” PVC Well Screen Pipe	180	LF	50	9,000
10	6” PVC Solid Wall Pipe	50	LF	20	1,000
11	12” McCrometer Meter and Vault	1	LS	11,000	11,000
12	12” PVC Pipe	70	LF	100	7,000
13	Concrete (Cleanout #2 Modification)	1	LS	7,000	7,000
14	Air-vac Release Valve and Vaults	2	Ea.	6,000	6,000
15	V-Notch Weir and Structure	2	Ea.	3,000	6,000
16	Sediment and Erosion Control	1	LS	5,000	5,000
17	Gravel Surfacing - Service Roads	1	LS	2,000	2,000
18	Concrete Washout Structure	1	LS	1,500	1,500
19	Final Cleanup and Restoration	1	LS	16,000	16,000
20	Hydroseeding	1,500	SY	0	1,200
				Subtotal Estimated Construction Cost	**208,280**
				Contingency @ 20%	41,656
				Subtotal	249,936
				Planning, Testing, CCTV, Design and Legal	29,500
				Project Management, QC and Administration	29,500
				Total Estimated Project Cost	**$ 308,936**

Implementation Schedule

The proposed implementation schedule anticipates a completed project by mid January of 2015. The milestone dates are shown below.

Item	Date Completed
Feasibility Study Submitted to CWCB	April 1, 2016
Preliminary Design	April 30, 2016
Feasibility Study Review and Approval by CWCB	May 15, 2016
Complete Delivery Pipe Improvements	May 31, 2016
Complete Final Design	June 30, 2016
State Reviews and Approvals	July 30, 2016
Biding and Contract Award	August 20, 2016
Notice to Proceed with Construction	September 10, 2016

Begin Construction September	September 15, 2016
Construction Complete	January 15, 2016

Permitting

All easements and rights of way have been arranged for.
The Company expects to be exempt from 404 permitting by Statutory Exemption, 33 CFR Section 323.4 (a) 3.

Institutional Considerations

The Dixon Canon Ditch and Reservoir Company needs authorization to borrow 90 percent of the total estimated project cost of $309,000 or $278,100 from the Colorado Water Conservation Board Construction Fund. The loan, if approved, from the CWCB will be contingent upon the successful negotiation of a contract between the CWCB and the DCD&RCo. The remaining 10% of the project cost will be funded through assessment of the Stockholders. Bidding and agreements with contractors will be finalized upon authorization of the CWCB Loan.

Financial Analysis

The Dixon Canon Ditch and Reservoir Company is requesting a 30-year loan from the CWCB. A blended agricultural-municipal lending rate would be 2.22% resulting in annual payments of $12,795.90. To this would be added $1,249.59 per year for the first 10 years to fund the emergency reserve account, for a total annual cost of $14,045.49. Table 3 is a summary of the financial aspects of the project. Annual assessments will increase from $15 per share, up to $450 per share with a loan of $1,842,026. This represents an annual assessment increase of $175, or $3.13 per acre-foot, based on average annual diversion of 27,956 acre-feet.

Table 3 Financial Summary

Project Cost	$ 309,000
Loan Amount (90% of Project Cost)	278,100
CWCB Loan Payment amount, including 10% loan reserve	14,045.49
Number of Shareholders	5
Number of Share of Stock	1,000
Current Assessment per Share	15
Future Assessment per Share	15
Annual Project Cost per acre-foot (Average annual diversions: 312 acre-feet.)	$ 45

All other funding for the project will be provided by DCD&RCo. Operating and maintenance costs are expected to decrease with the improvements, and can be accommodated by the DCD&RCo budget.

Credit Worthiness

The Dixon Canon Ditch and Reservoir Company currently has no outstanding debt.

Table 4 shows the Financial Ratios for the Dixon Canon Ditch and Reservoir Company and indicates average to strong ability to repay with the project in place.

Table 4 Financial Ratios

Financial Ratio	Without the Project	With the Project
Operating Ratio (Rev/Exp.)	100% (average)	100% (average)
Debt Service Coverage Ratio (Rev.-Exp.)/Debt Service	100% (average)	100% (average)
Cash Reserves to Current Expense	100% (average)	100% (average)
Annual Cost per share	$15 (strong)	$15 (strong)

Alternative Financing Considerations

No alternative financing options have been identified as of the date of this study.

Collateral

The DCD&RCo can offer the following collateral for the CWCB loan.

1. The DCD&RCo can offer as collateral, the project itself, if approved by a vote of the shareholders.

2. The DCD&RCo can offer as collateral, a pledge of assessment revenues.

Economic Analysis

Although shareholders in DCD&RCo will be impacted with increased assessments for construction and loan repayment, the project will have a long-term positive economic impact by assuring continued diversions into DCD&RCo system.

If the improvements are not made a critical component to the value of nearly 206 acres will be lost.

Social and Physical Impacts

The project will have no significant social impacts.

Although shareholders in the DCD&RCo will be impacted with increased assessments for construction and loan repayment, the project will have a long-term positive economic impact by assuring continued availability of water for agricultural and municipal purposes.

The project will have no significant physical impacts once construction is complete. The new diversion structures will occupy the same area as the existing structures.

Conclusions

1. The Dixon Canon Ditch and Reservoir Company is an incorporated entity in the State of Colorado with the ability to enter into a contract with the CWCB for the purpose of obtaining a Construction Fund loan.

2. Rights-of Way easements are adequate for the construction of this project.

3. The project would provide for the continued delivery of irrigation water to share holders.

4. The total estimated cost of the project is $309,000 and this will be funded, in part, by in-house financing. The Dixon Canon Ditch and Reservoir Company is applying for a $278,100 loan from the CWCB Construction Fund to cover 90% of the project cost.

5. The project is technically and financially feasible.

The selected alternative is technically and financially feasible. There are no known issues that would prevent the Dixon Canon Ditch and Reservoir Company from successfully completing this project.

Appendix A

Articles of Incorporation and By-Laws

B Y - L A W S

of

THE DIXON CANON DITCH AND RESERVOIR CO.

ARTICLE I.

OFFICERS.

The officers of this company shall consist of a President, Vice-President, Secretary and Treasurer, who shall be chosen at the first meeting of the Board of Directors after the annual meeting of the stockholders each year. The offices of the Secretary and Treasurer may be filled by the same person.

They shall be elected from the Board of Directors, except that the Secretary and Treasurer may or may not be a director. Said officers shall hold their respective offices until their successors are elected and have accepted, and entered upon the duties of their offices respectively. Vacancies in any office or upon the Board of Directors occasioned by death, resignation or otherwise may be filled by the Board of Directors by ballot.

ARTICLE II

DUTIES OF OFFICERS.

President. It shall be the duty of the President to preside at all meetings of the Board of Directors and of the stockholders, and to sign all bonds, deeds, agreements or other instruments of writing made and entered into by or in behalf of the Corporation, to sign all certificates of stock and perform all other acts incident to his office.

Vice-President. During the absence or inability of the President to perform the duties of that office, the same shall devolve upon and be performed by the Vice-President. In case of the absence or inability of both the President and Vice-President, the Board of Directors may elect a President pro tem who may temporarily perform the duties of the President.

Secretary. It shall be the duty of the Secretary to give due notice of all the meetings of the stockholders and Board of Directors and to keep a proper record of the minutes thereof. The Secretary shall be the general clerical officer of the corporation and shall have charge of all records, books and papers of the corporation as well as the corporate seal. He shall countersign and register all certificates of stock and sign all other documents requiring the signature of the President and attach the corporate seal of the Company on all instruments requiring the seal. He shall keep such assessment books, books of account and other records as the Board of Directors may require. At the close of each fiscal year, he shall make, and submit to the Board of Directors and at the stockholders' annual meeting, a financial statement of the Company, showing the amount of money received and expended. He shall discharge such other duties pertaining to his office as shall be prescribed by the Board of Directors and as are incident to such office in like corporations and shall receive therefor such compensation as the Board of Directors shall or may determine.

Assistant Secretary. During the absence or inability of the Secretary to perform the duties of that office, the same shall devolve upon and be performed by the Assistant Secretary.

Treasurer. It shall be the duty of the Treasurer to keep safe all the monies belonging to the corporation and disburse the same on warrants signed by the Secretary.

Assistant Treasurer. During the absence or inability of the Treasurer to perform the duties of that office, the same shall devolve upon and be performed by the Assistant Treasurer. The Assistant Secretary and the Assistant Treasurer may be the same person.

ARTICLE III.

BOARD OF DIRECTORS.

Sec. 1. Number. The Board of Directors shall consist of three (3) persons

Sec. 2. Powers and Duties. The Board of Directors shall have control of all the property and affairs of the Company, the management thereof, and all contracts in relation thereto, and shall have directory powers over all the officers, agents and employees of the Company, and shall see that they properly perform their duties. The Board of Directors shall elect or appoint all officers provided by the By-Laws of said Company and may appoint or employ such additional superintendents, agents, ditch riders, and other employees as the business of the Company shall require. All officers, agents or employees by them elected or appointed may be removed by a majority vote of the Board of Directors. They shall prescribe the duties of all officers, agents or employees; fix their compensation; and may, when deemed necessary, require security of any officer or agent for the faithful performance of his or her duties. They may make all necessary rules and regulations not inconsistent with the law, the Articles of Incorporation, or the By-Laws of the Company, for the guidance of the officers and management of affairs of the Company. They may incur such indebtedness as they deem necessary to carry out the object of the Company and authorize the execution by the President and the Secretary of any note or obligation for such, and secure, where necessary, the same by a mortgage upon the property of the Company. They may acquire, by purchase, condemnation, or otherwise, such property as is necessary to carry out the objects and purposes of the Company and may sell and dispose of such property of the Company as shall be required to carry out its objects and purposes.

Sec. 3. Meeting Time. The Board of Directors shall meet at such times as they may from time to time determine, and a meeting of the Board may at any time be called by the President or any other two members of the Board by personal notice to the Directors, or by placing such notice in the United States mails, addressed to each Director, at least twenty-four (24) hours before the date of such proposed meeting.

Sec. 4. Quorum. Two (2) members of the Board of Directors shall constitute a quorum for the transaction of business at any meeting regularly called or adjourned; but any meeting of the Directors, however called, shall be valid when every member

of the Board is present at such meeting, or shall give their several written consents thereto upon the recorded minutes thereof.

Sec. 5. Place of Meeting. Until otherwise determined by the Board, the regular place of meeting of the Board of Directors shall be at the office of the Company in the City of Fort Collins, Larimer County, Colorado.

Sec. 6. Indemnification of Directors and Officers. The Board of Directors may authorize the Company to pay expenses incurred by, or to satisfy a judgment or fine rendered or levied against, a present or former director, officer, or employee of this Company in an action brought by a third party against such person, whether or not the Company is joined as a party defendant, to impose a liability or penalty on such person for an act alleged to have been committed by such person while a director, officer or employee, or by the Company, or by both; provided, the Board of Directors determines in good faith that such director, officer, or employee was acting in good faith within what he reasonably believed to be the scope of his employment or authority and for a purpose which he reasonably believed to be in the best interests of the Company or its shareholders. Payments authorized hereunder include amounts paid and expenses incurred in settling any such action or threatened action. This Section does not apply to any action instituted or maintained in the right of the Company by a shareholder. The provisions of this Section shall apply to the estate, executor, administrator, heirs, legatees, or devisees of a director, officer, or employee, and the term "person" where used in the foregoing Section shall include the estate, executor, administrator, heirs, legatees, or devisees of such person.

ARTICLE IV.

MEETINGS OF THE MEMBERS OF THE COMPANY.

Sec. 1. Annual Meeting. The annual meeting of the stockholders of said Company shall be held on a date within the first forty-five (45) days of each calendar year, with such date and the place of meeting to be determined by the Board of Directors annually in

advance. Notice of the time, date and place of meeting shall be given to the stockholders by placing such written notice in the United States mails, addressed to each member whose address is known, as provided by the Statutes of the State of Colorado.

Sec. 2. Quorum. At any meeting of the stockholders of the Company, there shall be required to be present, in person or by proxy, a majority of the stockholders of the Company; but a lesser number shall have power to adjourn said meeting to a day certain, not exceeding a period of sixty (60) days. At any such meeting, it shall be first ascertained if a quorum is present, and if so, it shall proceed to the business of the meeting.

Sec. 3. Presiding Officers. The President shall preside at all meetings of the members, or in his absence, the Vice-President.

Sec. 4. Election of Directors. At each annual meeting, or adjourned meeting thereof, the members shall elect three (3) directors, Said election shall be by ballot of the stockholders.

Sec. 5. Rules of Order. Unless rules to the contrary are expressed in these By-Laws, Robert's Rules of Order shall prevail at all meetings.

ARTICLE V.

ASSESSMENTS ON STOCK.

Sec. 1. Levy of Assessment. The Company shall raise all necessary funds for construction, maintenance, repair, repayment of indebtedness or interest thereon, and other expenses of operation, by assessment against the stock of the Company, pro rata.

Sec. 2. Method of Levying. Assessments shall be levied at the annual meeting or at special meetings called for the purpose, a majority of the stock issued and outstanding represented, either by the owner in person or by proxy, in favor of such assessment; but, if said stockholders fail to hold any such meeting or fail to make or authorize any assessment by the first of April of any year, the Directors shall have power to make such assessment at any regular or special meeting called therefor for

that year.

Sec. 3. Delinquent Assessments.

A. All delinquent assessments shall draw interest, from the date same shall become due and payable, at the rate of twelve (12%) percent per annum.

B. The Company may also provide that no water shall be delivered until all assessments are paid.

Sec. 4. Sale of Stock for Non-Payment of Assessment. The Directors shall have the power to forfeit or sell stock of the Company in the hands of stockholders for failure to pay assessments that, from time to time, may become due and shall strictly follow the procedures set forth for forfeiture and/or sale of stock provided in CRS 1973 7-42-104(4) as the same now provides or as it shall, from time to time, be amended.

ARTICLE VI.

LOST STOCK CERTIFICATES.

In the event any stockholder shall lose his certificate or certificates representing such shares, the provisions of CRS 1973 7-42-114, et seq., as it shall from time to time be amended, shall apply; or such stockholder may make a presentation of the facts to the Board of Directors at a regular meeting of the Board of Directors, or at a meeting called for such purpose, and the Board of Directors shall have the authority to prescribe such steps for the issuance of a new certificate as the Board shall deem reasonable for the protection of the Company.

ARTICLE VII.

TRANSFER OF SHARES.

From and after March 1, 1975, no stock certificate shall be issued representing shares in a denomination of a lesser amount than the lowest fractional share then outstanding upon the records

of the Company. No shares of stock may be transferred on the records of the Company until all current assessments are paid in full.

ARTICLE VIII.

RESPONSIBILITY OF COMPANY.

This Company is not a common carrier and only water rights owned by the Company or Company shareholders shall be carried in Company ditches or stored in Company reservoirs or other Company facilities, except foreign water may be carried or stored in Company facilities only for shareholders of the Company and to land historically served by the Company. When such foreign water is carried or stored by or in Company facilities, charges therefor may be made from time to time in the discretion of the Board of Directors.

ARTICLE IX.

CORPORATE SEAL.

The corporate seal of this Company shall be and consist of an ordinary scroll with the name of the Company inscribed therein.

ARTICLE X.

AMENDMENT.

These By-Laws may be changed, amended or revoked at any time by an affirmative vote of at least two-thirds (2/3) of the Directors at any meeting of the Board of Directors.

ADOPTED BY THE BOARD OF DIRECTORS this 1st day of August, 1984.

(SEAL)

Director - C. Tom Herring

Director - David W. Whitham

Director - Kenneth L. Goldsberry

NOT FOR PROFIT

FILED
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ARTICLES OF INCORPORATION

OF

THE DIXON CANON DITCH AND RESERVOIR CO.

(NOT FOR PROFIT)

KNOW ALL MEN BY THESE PRESENTS: That we, C. Tom Herring, David W. Whitham and Kenneth L. Goldsberry, all residents of the County of Larimer and State of Colorado, being natural persons of the age of twenty-one years or more, do hereby associate ourselves together to form a mutual irrigation corporation pursuant to the statutes of Colorado, and in accordance with the provisions of said statutes we do hereby make, execute and acknowledge the following Articles of Incorporation:

ARTICLE I

NAME: The name of this corporation shall be THE DIXON CANON DITCH AND RESERVOIR COMPANY

ARTICLE II

EXISTENCE: This corporation shall have perpertual existence.

ARTICLE III

PURPOSES: The objects and purposes of our said corporation are to acquire, take over and own all of the property, rights, privileges and holding of The Dixon Canon Reservoir Company (which company has continuously operated from the date of its incorporation on or about August 8, 1885, first as a dejure and then after January 1, 1983, as a defacto corporation to the date hereof, but whose charter has expired) and to operate and control, keep and maintain not for pecuniary profits but for the mutual use and benefit of the members of said corporation that certain basin or reservoir known as Dixon Canon Reservoir, and situated in Sections 20 and 29, Township 7 North, Range 69 West of the 6th P. M., in the County of Larimer, State of Colorado, consisting of about eighty (80) acres, and to do and perform all needful things necessary for the proper operation of said reservoir for storage of water and distribution of the same among the stockholders herein for agricultural and domestic purposes.

COMPUTER UPDATE COMPLETE
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POWERS: Subject to any specific limitations imposed by these Articles of Incorporation, this corporation shall have the following powers:

1. All of the rights, powers and privileges now or hereinafter conferred on corporations organized under the laws of Colorado.

2. To borrow or loan money, with or without security, and to take all kinds of mortgages, pledges, and securities of real or personal property to secure loans made by it; and to use all lawful means for the collection of money due it.

3. To do everything necessary, suitable or proper for the accomplishment of any of its corporate purposes or powers, as set out above.

LIBERAL CONSTRUCTION: The foregoing statements of purposes and powers shall be liberally construed in aid of the powers of this corporation, and the powers and purposes stated in each clause shall be in nowise limited or restrict by any terms or provision of any other clause, and shall be regarded not only as independent purposes, but the purposes and powers stated shall be construed distributively as each object expressed, and the enumeration as to specific powers shall not be construed so as to limit in any manner the aforesaid general powers, but are in furtherance of, and in addition to and not in limitation of said general powers.

ARTICLE IV

CAPITAL STOCK: The aggregate number of shares which the corporation shall have authority to issue is one thousand (1000) shares of common stock, each of said shares to have a par value of Ten Dollars ($10.00).

ARTICLE V

PARTIAL LIQUIDATION: The Board of Directors may from time to time distribute to the shareholders in partial liquidation, out of stated capital or capital surplus of the corporation, a portion of its assets, in cash or property, subject to the limitations contained in the statutes of Colorado.

ARTICLE VI

DIRECTORS: The affairs and managment of said corporation shall be vested in the Board of Directors, composed of three persons. The initial board members, and their names and addresses, shall be as follows:

NAME	ADDRESS
C. Tom Herring	2424 S. Overland Trail Fort Collins, CO 80526
David W. Whitham	3225 Moore Lane Fort Collins, CO 80526
Kenneth L. Goldsberry	2310 Moffett Drive Fort Collins, CO 80526

ARTICLE VII

REGISTERED OFFICE: The address of the initial registered office of the corporation is 3225 Moore Lane, Fort Collins, Colorado 80526. The name of its initial registered agent at such address is David W. Whitham. The principal place of business of said corporation shall be in the County of Larimer, State of Colorado.

ARTICLE VIII

NAMES AND ADDRESSES OF INCORPORATORS: The names and addresses of each incorporator is as follows:

NAME	ADDRESS
C. Tom Herring	2424 S. Overland Trail Fort Collins, CO 80526
David W. Whitham	3225 Moore Lane Fort Collins, CO 80526
Kenneth L. Goldsberry	2310 Moffett Drive Fort Collins, CO 80526

IN WITNESS WHEREOF, we have hereunto set our hands and seals this 3rd day of July, 1984.

C. Tom Herring

C. Tom Herring

David W. Whitham

David W. Whitham

Kenneth L. Goldsberry

Kenneth L. Goldsberry

STATE OF COLORADO)
) ss.
County of Larimer)

The above and foregoing instrument was acknowledged before me this 24 day of July, 1984, by C. Tom Herring, David W. Whitham and Kenneth L. Gulisberry as incorporators of The Dixon Canon Ditch and Reservoir Co.

Witness my hand and official seal.

My Commission Expires: 4-5-91.

Notary Public

Address: 110 E. OAK ST.
FT. COLLINS, CO 80524

Appendix B

Water Right Summary

Structure Summary Report

Structure Name: DIXON CANON RES **Water District:** 3 **Structure ID Number:** 3731

Source: Dixon Creek

Location:	Q10	Q40	Q160	Section	Twnshp	Range	PM
		SW	SE	20	7N	69W	S

Distance From Section Lines: From N/S Line: From E/W Line:

UTM Coordinates (NAD 83): Northing (UTM y): 4489160 Easting (UTM x): 487950 Spotted from PLSS distances from section lines

Latitude/Longitude (decimal degrees): 40.553113 -105.142322

Water Rights Summary:						
Total Decreed Rate(s) (CFS):	Absolute:	0.0000	Conditional:	0.0000	AP/EX:	0.0000
Total Decreed Volume(s) (AF):	Absolute:	469.0000	Conditional:	0.0000	AP/EX:	0.0000

Water Rights -- Transactions

Case Number	Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority Number	Decreed Amount	Adjudication Type	Uses	Action Comment
CA1591	1904-12-09	1885-10-08	13065.00000	0		448.0000 AF	O	1	351 ASP 442, G.H. 10 FT.
CA2031	1922-04-22	1906-08-30	20695.00000	0		21.0000 AF	S	1	725 G.H. 16 FT.

Water Rights -- Net Amounts

Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority/Case Number	Rate (CFS)			Volume (Acre-Feet)		
					Absolute	Conditional	AP/EX	Absolute	Conditional	AP/EX
1904-12-09	1885-10-08	13065.00000	0	CA1591				448.0000	0	0
1922-04-22	1906-08-30	20695.00000	0	CA2031				21.0000	0	0

Irrigated Acres Summary -- Totals From Various Sources

GIS Total (Acres):	206.1415	Reported:	2010
Diversion Comments Total (Acres):	0	Reported:	2001
Structure Total (Acres):		Reported:	

Irrigated Acres From GIS Data

Year	Land Use	Acres Flood	Acres Furrow	Acres Sprinkler	Acres Drip	Acres Groundwater	Acres Total
1956	***Year Total***	800.36	0	0	0	0	800.36
1956	ALFALFA	80.49	0	0	0	0	80.49
1956	CORN	60.01	0	0	0	0	60.01
1956	GRASS_PASTURE	614.68	0	0	0	0	614.68
1956	SUGAR_BEETS	45.19	0	0	0	0	45.19
1976	***Year Total***	486.69	0	0	0	0	486.69
1976	ALFALFA	80.49	0	0	0	0	80.49
1976	CORN	34.68	0	0	0	0	34.68
1976	GRASS_PASTURE	326.34	0	0	0	0	326.34
1976	SUGAR_BEETS	45.19	0	0	0	0	45.19
1987	***Year Total***	335.10	0	0	0	0	335.10
1987	ALFALFA	58.26	0	0	0	0	58.26
1987	CORN	66.07	0	0	0	0	66.07
1987	GRASS_PASTURE	202.66	0	0	0	0	202.66
1987	SMALL_GRAINS	8.11	0	0	0	0	8.11
1997	***Year Total***	227.00	0	0	0	0	227.00
1997	GRASS_PASTURE	227.00	0	0	0	0	227.00
2001	***Year Total***	208.45	0	0	0	0	208.45
2001	GRASS_PASTURE	208.45	0	0	0	0	208.45
2005	***Year Total***	206.14	0	0	0	0	206.14
2005	GRASS_PASTURE	206.14	0	0	0	0	206.14
2010	***Year Total***	206.14	0	0	0	0	206.14
2010	GRASS_PASTURE	206.14	0	0	0	0	206.14

Diversion Summary in Acre-Feet - Total Water Through Structure

Year	FDU	LDU	DWC	Maxq & Day	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Total
1997	1997-05-07	1997-07-24	16	8 07-19	0	0	0	0	0	0	50	0	96	0	0	0	146
1998	1998-04-01	1998-08-02	50	9 07-26	0	0	0	0	0	37	0	99	119	24	0	0	279
1999	1999-08-13	1999-08-19	7	8 08-14	0	0	0	0	0	0	0	0	0	95	0	0	95
2000	2000-03-01	2000-08-31	92	3 08-01	0	0	0	0	1	0	0	146	0	168	0	0	315
2001	2001-06-01	2001-08-31	61	3	0	0	0	0	0	0	0	186	0	54	0	0	240
2002	2002-04-01	2002-09-30	121	4	0	0	0	0	0	231	0	91	91	0	91	0	504
2003	2003-03-22	2003-10-31	133	2 08-01	0	0	0	0	33	0	0	92	99	142	0	132	498
2004	2004-06-01	2004-09-30	60	3 09-01	0	0	0	0	0	0	0	116	0	0	159	0	275
2005	2005-07-01	2005-10-31	92	2 07-23	0	0	0	0	0	0	0	0	136	0	95	36	267
2006	2006-06-01	2006-10-26	124	2 09-01	0	0	0	0	0	0	0	116	20	139	139	2	416
2007	2007-01-01	2007-10-31	152	3 07-01	0	0	9	3	0	0	0	0	159	115	0	80	366
2008	2008-05-01	2008-10-31	154	2 07-09	0	0	0	0	0	0	53	100	137	38	0	78	406
2009	2009-04-01	2009-10-31	122	2 09-01	0	0	0	0	0	25	0	0	48	0	127	63	263
2010	2010-03-01	2010-10-31	184	2 07-26	0	0	0	0	7	5	0	0	107	4	101	75	300
			Minimum:	2	0	0	0	0	0	0	0	0	0	0	0	0	95
			Maximum:	9	0	0	9	3	33	231	53	186	159	168	159	132	504
			Average:	4	0	0	1	0	3	21	7	68	72	56	51	33	312

14.00 years with diversion records

Notes: The average considers all years with diversion records, even if no water is diverted.
The above summary lists total monthly diversions.
* = Infrequent Diversion Record. All other values are derived from daily records.
Average values include infrequent data if infrequent data are the only data for the year.

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comment
1973	Water taken but no data available		
1974	No information available		
1975	Structure not usable		
1976	Water taken but no data available		
1977	Water taken but no data available		
1978	Water taken but no data available		
1979	Water taken but no data available		
1980	No information available		
1982	Water taken but no data available		
1983	No information available		
1984	Water taken but no data available		
1985	Water taken but no data available		
1986	Water taken but no data available		
1987	Water taken but no data available	0	
2002			FILLED BY ID 1060
2003			FILLED BY ID 1060
2004			FILLED BY ID 1060
2005			FILLED BY ID 1060
2009			FILLED BY ID 1060
2012			FILLED BY ID 1060
2013			FILLED BY ID 1060
2014			FILLED BY ID 1060

Note: Diversion comments and reservoir comments may be shown for a structure, if both are available.

Appendix D

CWCB Loan Application

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Water Project Loan Program

Application Type

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

Agency/Company Information

Company / Borrower Name: THE DIXON CANON DITCH AND RESERVOIR CO.

Authorized Agent &Title: Doug Kokes

Address: Dixon Water Board 413 South Bryan Fort Collins, CO 80521

Phone: (970)416-2816 | Email: dkokes@fcgov.com

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

County: Larimer | Number of Shares/Taps: 1,000 Shares

Water District: 3 | Avg. Water Diverted/Yr Average 312 acre-feet

Number of Shareholders/Customers Served: 5 Shareholders | Current Assessment per Share $ 15.00/Share (Ditch Co) | Average monthly water bill $ N/A (Municipality)

Contact Information

Project Representative: Paul Rupp

Phone: (970)689-8250 | Email: horsetoothvines@outlook.com

Engineer: John G. Gauthiere

Phone: (970)302-0039 | Email: john@gauthiere-engineering.com

Attorney: Brent A. Bartlett, Fisher, Brown, Bartlett and Gunn

Phone: (970)407-9000 x 217 | Email: brentbartlett@fbgpc.com

Project Information

Project Name: Dixon Reservoir Dam Improvement Project

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

Dam improvements including seepage collection improvements and outlet pipe modification to improve delivery to customers

Other Costs include $3,620 for Surveying, $8,600 for Geotechnical Services and $4,500 for a Feasibility Study

General Location: (Attach Map of Area)

Estimated Engineering Costs: $42,280.00	Estimated Construction Costs: $250,000.00
Other Costs (Describe Above): $16,720.00	Estimated Total Project Costs: $309,000.00
Requested Loan Amount: *(Limit 90% of Total Project Costs)* $278,100.00	Project Start Date(s) Design: 3-16-2016 Construction: 8-1-2016

Signature

Dixon Canon Vpres 4-1-2016

Dixon Canon Pres. 4-1-2016

Signature / Title Date

Return to: Finance Section Attn: Anna Mauss
1313 Sherman St #718
Denver, CO 80203
Ph. 303/866.3449
e-mail: anna.mauss@state.co.us

Appendix E

Loan Amortization Schedule

Colorado Water Conservation Board
Construction Fund Loan Program

Repayment Schedule

Contract #: _____ *1st Payment Due* _____

Borrower: DIXON CANON DITCH AND RESERVOIR CO.

Project: Dixon Reservoir Dam Improvement Project

Principal: $278,100 *Annual Payment:* $12,795.90

Interest: 2.22% *Total Loan Payout* $383,877.11

Term: 30 years

Period	Year	Loan Balance	Annual Payment	Amount to Interest	Amount to Principal
1	2016	$278,100.00	12,795.90	$6,173.82	$6,622.08
2	2017	271,477.92	12,795.90	$6,026.81	$6,769.09
3	2018	264,708.83	12,795.90	$5,876.54	$6,919.36
4	2019	257,789.47	12,795.90	$5,722.93	$7,072.97
5	2020	250,716.50	12,795.90	$5,565.91	$7,229.99
6	2021	243,486.51	12,795.90	$5,405.40	$7,390.50
7	2022	236,096.01	12,795.90	$5,241.33	$7,554.57
8	2023	228,541.44	12,795.90	$5,073.62	$7,722.28
9	2024	220,819.16	12,795.90	$4,902.19	$7,893.71
10	2025	212,925.45	12,795.90	$4,726.94	$8,068.96
11	2026	204,856.49	12,795.90	$4,547.81	$8,248.09
12	2027	196,608.40	12,795.90	$4,364.71	$8,431.19
13	2028	188,177.21	12,795.90	$4,177.53	$8,618.37
14	2029	179,558.84	12,795.90	$3,986.21	$8,809.69
15	2030	170,749.15	12,795.90	$3,790.63	$9,005.27
16	2031	161,743.88	12,795.90	$3,590.71	$9,205.19
17	2032	152,538.69	12,795.90	$3,386.36	$9,409.54
18	2033	143,129.15	12,795.90	$3,177.47	$9,618.43
19	2034	133,510.72	12,795.90	$2,963.94	$9,831.96
20	2035	123,678.76	12,795.90	$2,745.67	$10,050.23
21	2036	113,628.53	12,795.90	$2,522.55	$10,273.35
22	2037	103,355.18	12,795.90	$2,294.48	$10,501.42
23	2038	92,853.76	12,795.90	$2,061.35	$10,734.55
24	2039	82,119.21	12,795.90	$1,823.05	$10,972.85
25	2040	71,146.36	12,795.90	$1,579.45	$11,216.45
26	2041	59,929.91	12,795.90	$1,330.44	$11,465.46
27	2042	48,464.45	12,795.90	$1,075.91	$11,719.99
28	2043	36,744.46	12,795.90	$815.73	$11,980.17
29	2044	24,764.29	12,795.90	$549.77	$12,246.13
30	2045	12,518.16	12,795.90	$277.90	$12,518.00
		Totals	$383,877.11	$105,777.16	$278,099.84

Appendix F

Stockholders List

Dixon Canon Ditch and Reservoir Company
Stockholders

City of Fort Collins Parks Division	830 shares x $ 15.00/ share =	$ 12,450.00
Tefft Acres	110 shares x $ 15.00/ share =	$ 1,650.00
Mr. & Mrs. Russell Parker	20 shares x $ 15.00/ share =	$ 300.00
Mr. & Mrs. George Holter	30 shares x $ 15.00/ share =	$ 450.00
Dr. & Mrs. Tom Pixley	10 shares x $ 15.00/ share =	$ 150.00
	Total	$15,000.00

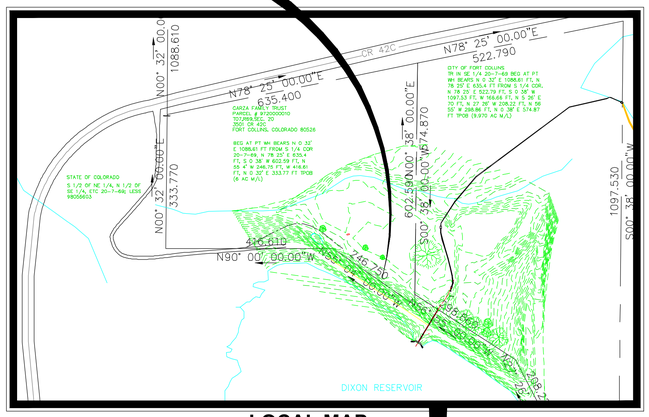
DIXON RESERVOIR DAM IMPROVEMENT PROJECT

DIXON CANON DITCH AND RESERVOIR COMPANY

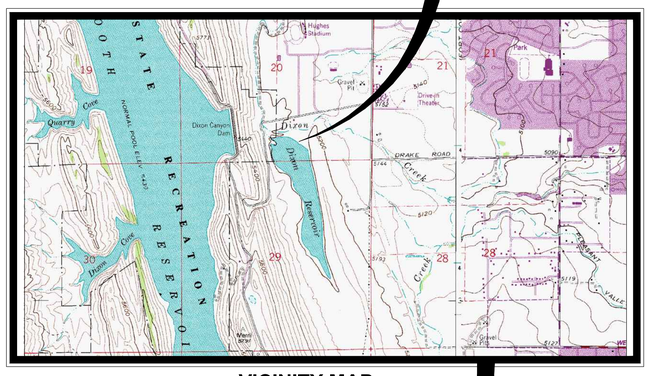
WATER DIVISION 1 WATER DISTRICT 1 DAMID 030124

LARIMER COUNTY, COLORADO

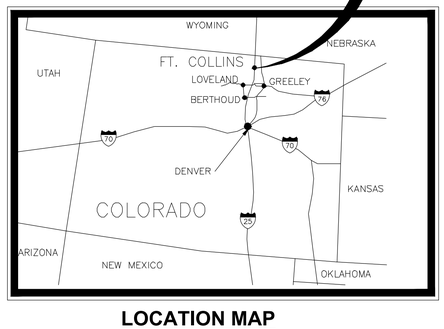
PROJECT SITE



LOCAL MAP



VICINITY MAP



LOCATION MAP

DRAWING INDEX

SHEET NUMBER	DESCRIPTION
1.	COVER SHEET, VICINITY MAP, DRAWING INDEX
2.	GENERAL NOTES
3.	STRUCTURAL NOTES
4.	EXISTING SITE LAYOUT
5.	EXISTING DAM OUTLET PLAN AND PROFILE
6.	PROPOSED OUTLET MODIFICATIONS PLAN & PROFILE
7.	OUTLET IMPROVEMENT DETAILS
8.	SEEPAGE AREA 1 LAYOUT
9.	SEEPAGE AREA 1 PLAN & PROFILE
10.	SEPAGE AREA 2 PLAN PROFILE
11.	DETAILS - EROSION CONTROL
12.	DETAILS
13.	DETAILS
14.	DETAILS
15.	DETAILS

PROJECT CONTROL:

CITY OF FORT COLLINS
BENCH MARK LOCATED AT NE COR. OF WEST DRAKE RD. AND OVERLAND TRAIL, ON A POWER TOWER BASE.
IDENTIFIER: 26-29
NAVD 88 ELEV.: 5148.63

SITE CONTROL POINT CP1
N: _____
E: _____
Elev: _____

SITE CONTROL POINT CP2
N: _____
E: _____
Elev: _____

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

I HEREBY CERTIFY THAT THESE PLANS FOR THE PEACEFUL VALLEY SCOUT RANCH LAKE DAM REHABILITATION PROJECT WERE PREPARED BY ME (OR UNDER MY DIRECT SUPERVISION) FOR THE OWNER THEREOF.

JOHN G. GAUTHIERE, P.E. COLORADO P.E. #22136

APPROVED ON THE _____DAY OF _____20___.

STATE ENGINEER

DEPUTY STATE ENGINEER

THESE PLANS REPRESENT THE AS-CONSTRUCTED CONDITIONS OF PEACEFUL VALLEY SCOUT RANCH LAKE DAM TO THE BEST OF OUR KNOWLEDGE AND JUDGEMENT, BASED IN PART ON INFORMATION FURNISHED BY OTHERS AS OF THE ___ DAY OF _____, 20___.

JOHN G. GAUTHIERE, P.E. # 22136

PRELIMINARY
NOT FOR CONSTRUCTION

C-_____

REVISIONS

DATE	DESCRIPTION	BY

GAUTHIERE ENGINEERING, INC.
2157 Buena Vista Drive
Greeley, Colorado 80634
Office (970) 330-0855 Cell (970) 302-0039

DESIGNED JGG
DRAWN JGG
CHECKED JGG

COLORADO REGISTERED PROFESSIONAL ENGINEER 22136 JOHN D. GAUTHIERE 03/01/2016

DIXON DITCH AND RESERVOIR CO.
DIXON RESERVOIR (DAMID 030124)
DAM IMPROVEMENT PROJECT
COVER SHEET

PROJECT NO. _
SCALE HORIZ.: AS SHOWN VERT.: NA
DATE 03-30-2016
SHEETS 15
SHEET 1

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CR 42C

N00° 32' 00.00"E 1088.610

N78° 25' 00.00"E 635.400

N78° 25' 00.00"E 522.790

N00° 32' 00.00"E 333.770

STATE OF COLORADO

S 1/2 OF NE 1/4, N 1/2 OF SE 1/4, ETC 20-7-69; LESS 98055603

GARZA FAMILY TRUST
PARCEL # 9720000010
T07,R69,SEC. 20
3501 CR 42C
FORT COLLINS, COLORADO 80526

BEG AT PT WH BEARS N 0 32' E 1088.61 FT FROM S 1/4 COR 20-7-69, N 78 25' E 635.4 FT, S 0 38' W 602.59 FT, N 55 4' W 246.75 FT, W 416.61 FT, N 0 32' E 333.77 FT TPOB (6 AC M/L)

CITY OF FORT COLLINS
TR IN SE 1/4 20-7-69 BEG AT PT WH BEARS N 0 32' E 1088.61 FT, N 78 25' E 635.4 FT FROM S 1/4 COR, N 78 25' E 522.79 FT, S 0 38' W 1097.53 FT, W 166.66 FT, N 5 26' E 70 FT, N 27 26' W 208.22 FT, N 56 55' W 298.86 FT, N 0 38' E 574.87 FT TPOB (9.970 AC M/L)

N00° 38' 00.00"E 574.870

S00° 38' 00.00"W 602.590

S00° 38' 00.00"W 1097.530

CLEANOUT #3

4,270'x18" PIPE

EXIST. RAMP FOR CONSTRUCTION EQUIPMENT ACCESS TO DOWNSTREAM SIDE OF DAM

PROPOSED TEMPORARY CONSTRUCTION EASEMENT

396.085 N90° 00' 00.00"W

SEEPAGE AREA #2 (OLD FINGER DRAIN)

N55° 04' 00.00"W 272.034

416.610 N90° 00' 00.00"W

SEEPAGE AREA #1

N55° 04' 00.00"W 246.750

EXIST. 575' OF 12" PVC SIPHON PIPE

EXIST. CLEANOUT #2

EXIST. 150' OF 18" PVC PIPE

EXIST. PARSHALL FLUME

N56° 55' 00.00"W 298.860

EXIST. 10 PVC PIPE LINING ORIGINAL 12" CLAY PIPE

EXIST. CONC. HEADWALL

EXIST. CONC. GATE HEADWALL

N27° 26' 00.00"W 208.220

DIXON RESERVOIR

50 25 0 50 100 150
SCALE IN FEET

PROJECT CONTROL:

CITY OF FORT COLLINS
BENCH MARK LOCATED AT NE COR. OF WEST DRAKE RD. AND OVERLAND TRAIL, ON A POWER TOWER BASE.
IDENTIFIER: 26-29
NAVD 88 ELEV.: 5148.63

SITE CONTROL POINT CP1
N: _____
E: _____
Elev: _____

SITE CONTROL POINT CP2
N: _____
E: _____
Elev: _____

PRELIMINARY
NOT FOR CONSTRUCTION

C-_____

REVISIONS		
DATE	DESCRIPTION	BY

GAUTHIERE ENGINEERING, INC.
2157 Buena Vista Drive
Greeley, Colorado 80634
Office (970) 330-0855 Cell (970) 302-0039

DESIGNED JGG
DRAWN JGG
CHECKED JGG

COLORADO REGISTERED PROFESSIONAL ENGINEER 22136 JOHN D. GAUTHIERE
03/01/2016

DIXON DITCH AND RESERVOIR CO.
DIXON RESERVOIR (DAMID 030124)
DAM IMPROVEMENT PROJECT
SITE LAYOUT

PROJECT NO. —
SCALE HORIZ.: AS SHOWN VERT.: NA
DATE 03-01-2016
SHEETS 15
SHEET 4

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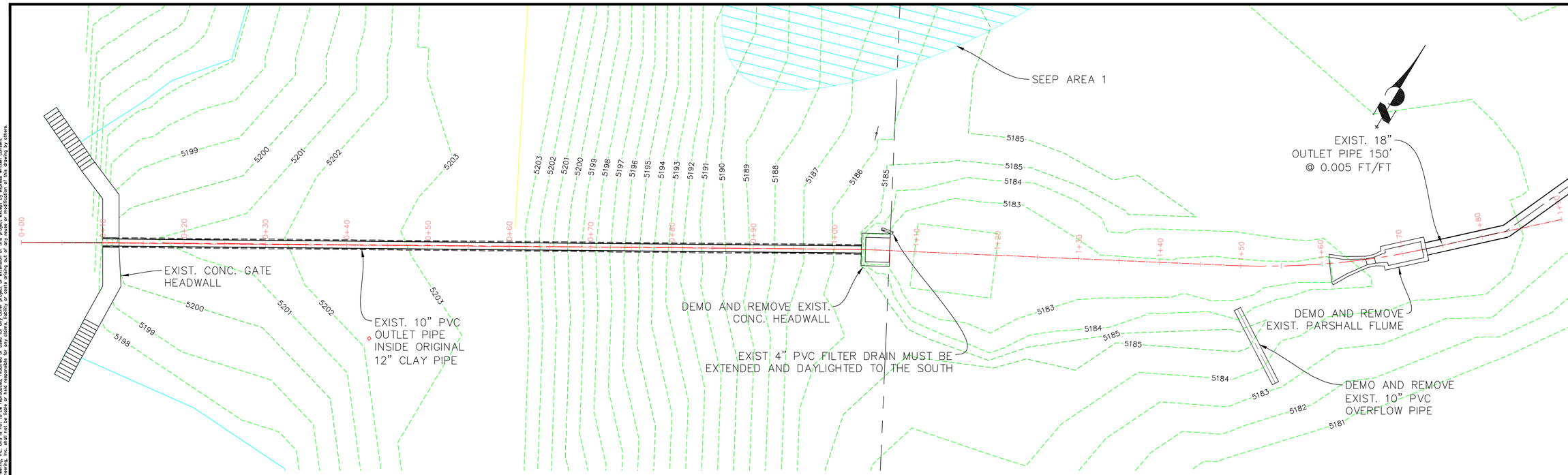
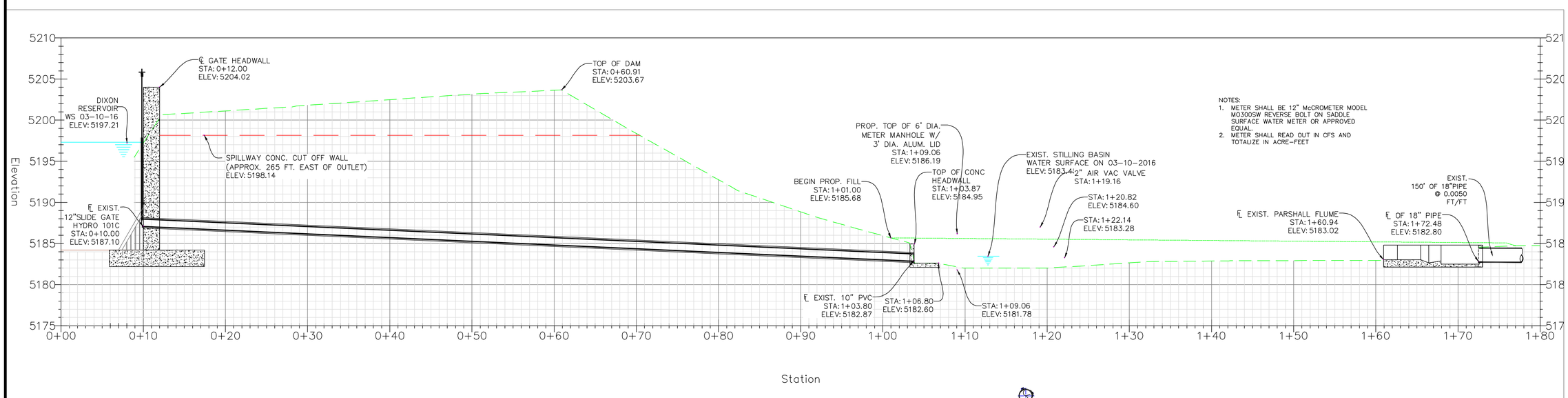


1 PLAN VIEW OF CENTERLINE OF OUTLET

Scale: 1"=6'H, 1"=6' V



NOTES:
1. METER SHALL BE 12" McCROMETER MODEL MO300SW REVERSE BOLT ON SADDLE SURFACE WATER METER OR APPROVED EQUAL.
2. METER SHALL READ OUT IN CFS AND TOTALIZE IN ACRE-FEET

2 PROFILE OF OUTLET

Scale: 1"=6'H, 1"=6' V

6 3 0 6 12 18
SCALE IN FEET

PRELIMINARY
NOT FOR CONSTRUCTION

C-_____

REVISIONS		
DATE	DESCRIPTION	BY

GAUTHIERE ENGINEERING, INC.
2157 Buena Vista Drive
Greeley, Colorado 80634
Office (970) 330-0855 Cell (970) 302-0039

DESIGNED JGG
DRAWN JGG
CHECKED JGG

COLORADO REGISTERED 22136 PROFESSIONAL ENGINEER
John D. Gauthiere 03/01/2016

DIXON DITCH AND RESERVOIR CO.
DIXON RESERVOIR (DAMID 030124)
DAM IMPROVEMENT PROJECT
EXISTING PLAN & PROFILE & DEMO. PLAN

PROJECT NO. —
SCALE HORIZ.: AS SHOWN VERT.: NA
DATE 03-01-2016
SHEETS 15
SHEET 5

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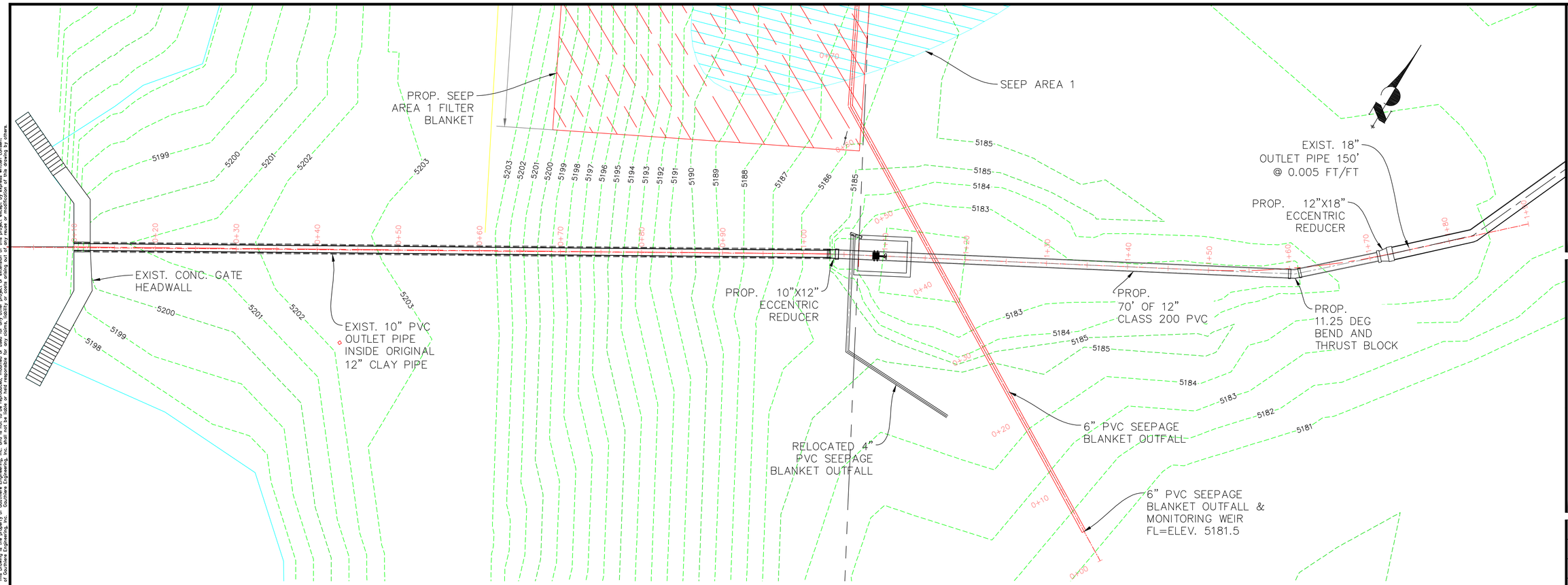
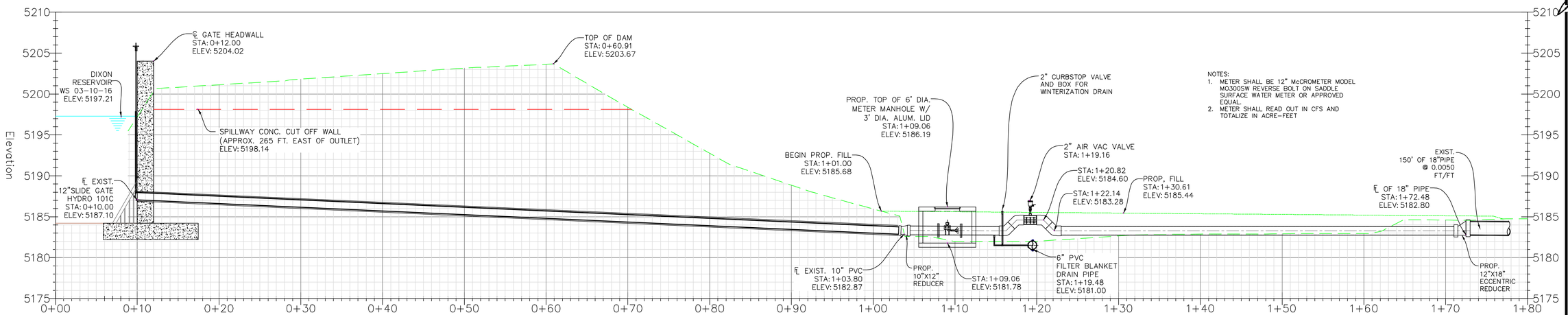


1 PLAN VIEW OF CENTERLINE OF OUTLET

Scale: 1"=6'H, 1"=6' V

6 3 0 6 12 18

SCALE IN FEET



NOTES:
1. METER SHALL BE 12" McCROMETER MODEL MO300SW REVERSE BOLT ON SADDLE SURFACE WATER METER OR APPROVED EQUAL.
2. METER SHALL READ OUT IN CFS AND TOTALIZE IN ACRE-FEET

2 PROFILE OF OUTLET

Scale: 1"=6'H, 1"=6' V

6 3 0 6 12 18

SCALE IN FEET

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NOT FOR CONSTRUCTION

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Greeley, Colorado 80634
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COLORADO REGISTERED PROFESSIONAL ENGINEER 22136 JOHN J. GAUTHIERE 03/01/2016

DIXON DITCH AND RESERVOIR CO.

DIXON RESERVOIR (DAMID 030124)
DAM IMPROVEMENT PROJECT
PROPOSED PLAN & PROFILE

PROJECT NO. —
SCALE HORIZ.: AS SHOWN VERT.: NA
DATE 03-01-2016
SHEETS 15
SHEET 6

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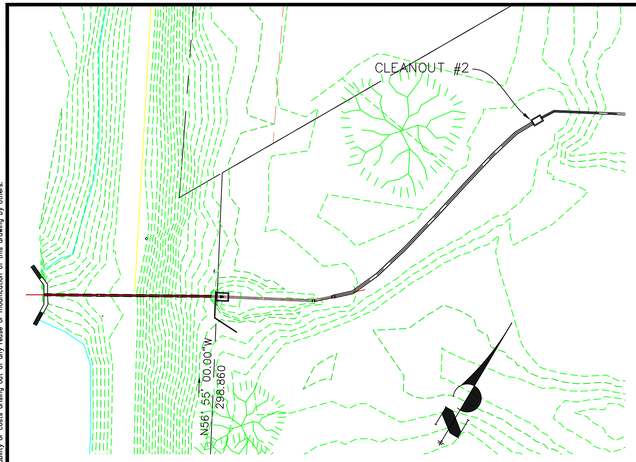
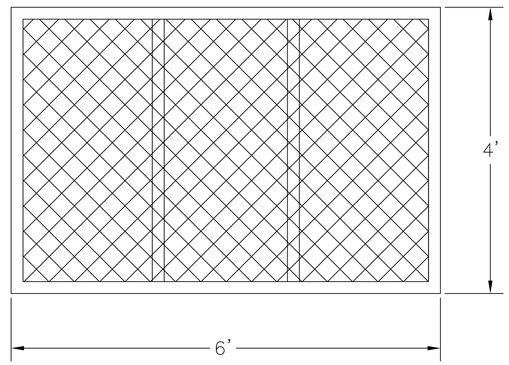


1 LOCATION MAP FOR CLEANOUT #2
Scale: 1"=40'
40 20 0 40 80 120
SCALE IN FEET



2 EXISTING GRATING FOR CLEANOUT #2 (REUSE)
Scale: 1"=1'
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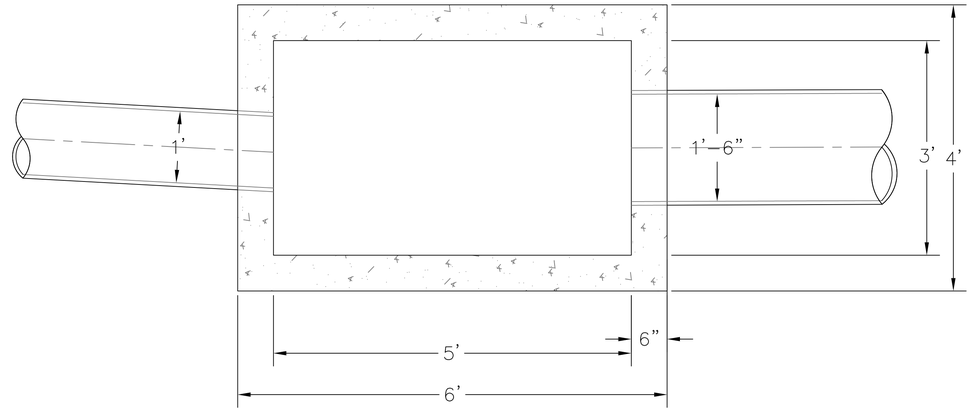
SCALE IN FEET



3 EXISTINGPLAN VIEW CLEANOUT #2
Scale: 1"=1'
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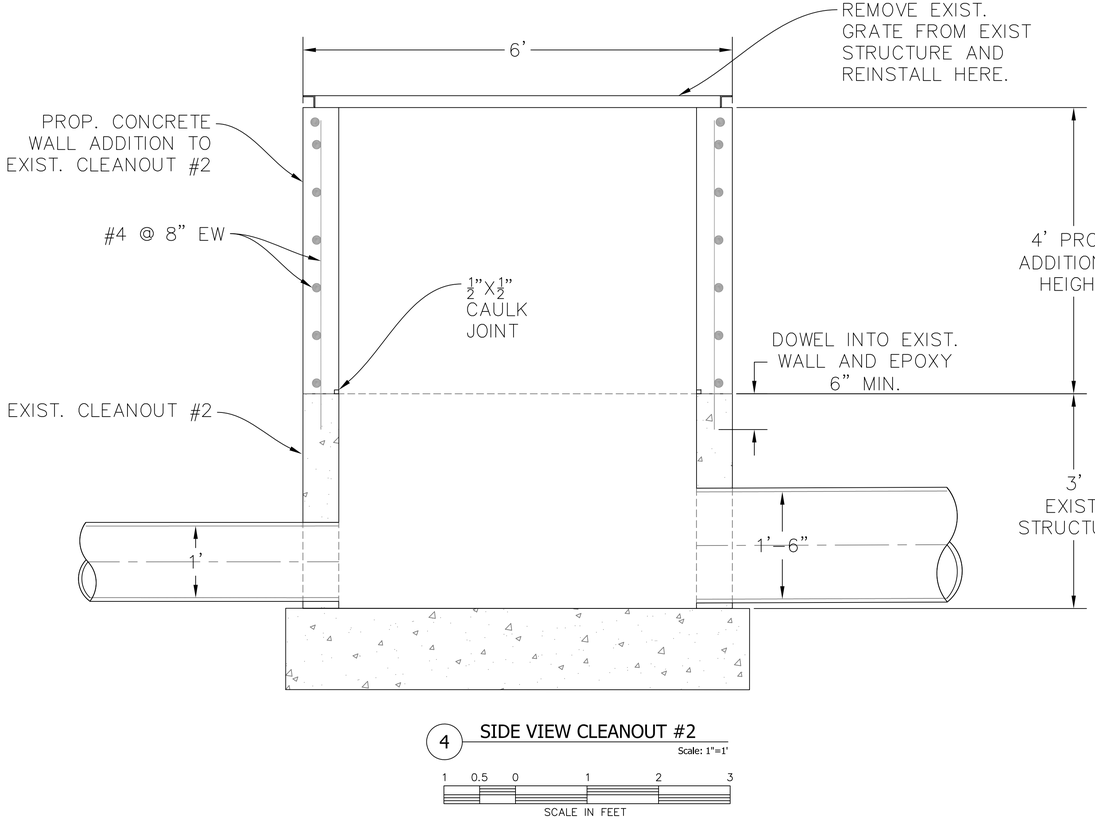
SCALE IN FEET



4 SIDE VIEW CLEANOUT #2
Scale: 1"=1'
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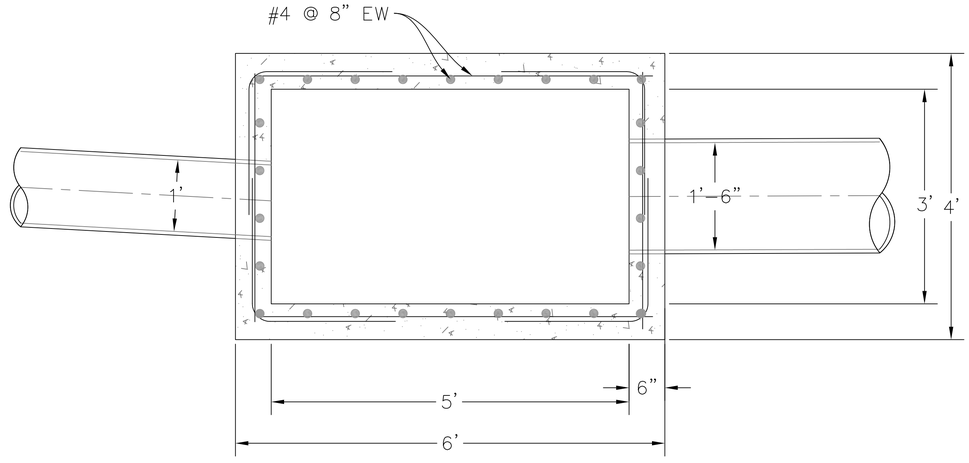
SCALE IN FEET



5 PROP. REINF. PLAN VIEW CLEANOUT #2
Scale: 1"=1'
1 0.5 0 1 2 3
SCALE IN FEET

PRELIMINARY
NOT FOR CONSTRUCTION

C-_____

REVISIONS

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2157 Buena Vista Drive
Greeley, Colorado 80634
Office (970) 330-0855 Cell (970) 302-0039

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CHECKED JGG

COLORADO REGISTERED CIVIL ENGINEERING GRADUATE 22136 PROFESSIONAL ENGINEER
John D. Gauthiere 03/01/2016

DIXON DITCH AND RESERVOIR CO.
DIXON RESERVOIR (DAMID 030124)
DAM IMPROVEMENT PROJECT
OUTLET IMPROVEMENT DETAILS

PROJECT NO. —
SCALE HORIZ.: AS SHOWN VERT.: NA
DATE 03-01-2016
SHEETS 15
SHEET 7

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N55° 04' 00.00"W
246.750

182' ~ 54.6

SEEP AREA 1

PROP. 12"X8" ECCENTRIC REDUCER

PROP. 11.25° DEG BEND AND THRUST BLOCK

PROP. 70' OF 12" CLASS 200 PVC

6" PVC SEEPAGE BLANKET OUTFALL

6" PVC SEEPAGE BLANKET OUTFALL & MONITORING WELL & FL-ELEV. 5181.9

PROP. 10"X12" ECCENTRIC REDUCER

RELOCATED PVC SEEPAGE BLANKET OUTFALL

PROP. SEEP AREA 1 FILTER BLANKET

N56° 55' 00.00"W
298.860

2+44 2+60 2+70 2+80 2+90 2+20 2+10 2+00 1+90 1+80 1+70 1+60 1+50 1+40 1+30 1+20 1+10 1+00 0+90 0+80 0+70 0+60 0+50 0+40 0+30 0+20 0+10 0+00

5181 5182 5183 5184 5185 5186 5187 5188 5189 5190 5191 5192 5193 5194 5195 5196 5197 5198 5199 5200 5201 5202 5203

10 5 0 10 20 30
SCALE IN FEET

PROJECT CONTROL:

CITY OF FORT COLLINS
BENCH MARK LOCATED AT NE
COR. OF WEST DRAKE RD.
AND OVERLAND TRAIL, ON A
POWER TOWER BASE.
IDENTIFIER: 26-29
NAVD 88 ELEV.: 5148.63

SITE CONTROL POINT CP1
N: _____
E: _____
Elev: _____

SITE CONTROL POINT CP2
N: _____
E: _____
Elev: _____

PRELIMINARY
NOT FOR CONSTRUCTION

C-_____

REVISIONS		
DATE	DESCRIPTION	BY

GAUTHIERE ENGINEERING, INC.
2157 Buena Vista Drive
Greeley, Colorado 80634
Office (970) 330-0855 Cell (970) 302-0039

DESIGNED JGG
DRAWN JGG
CHECKED JGG

COLORADO REGISTERED 22136 PROFESSIONAL ENGINEER
John D. Gauthiere
03/01/2016

DIXON DITCH AND RESERVOIR CO.
DIXON RESERVOIR (DAMID 030124)
DAM IMPROVEMENT PROJECT
SEEP #1 FILTER BLANKET LAYOUT

PROJECT NO. —
SCALE HORIZ.: AS SHOWN
VERT.: NA
DATE 03-01-2016
SHEETS 15
SHEET 8

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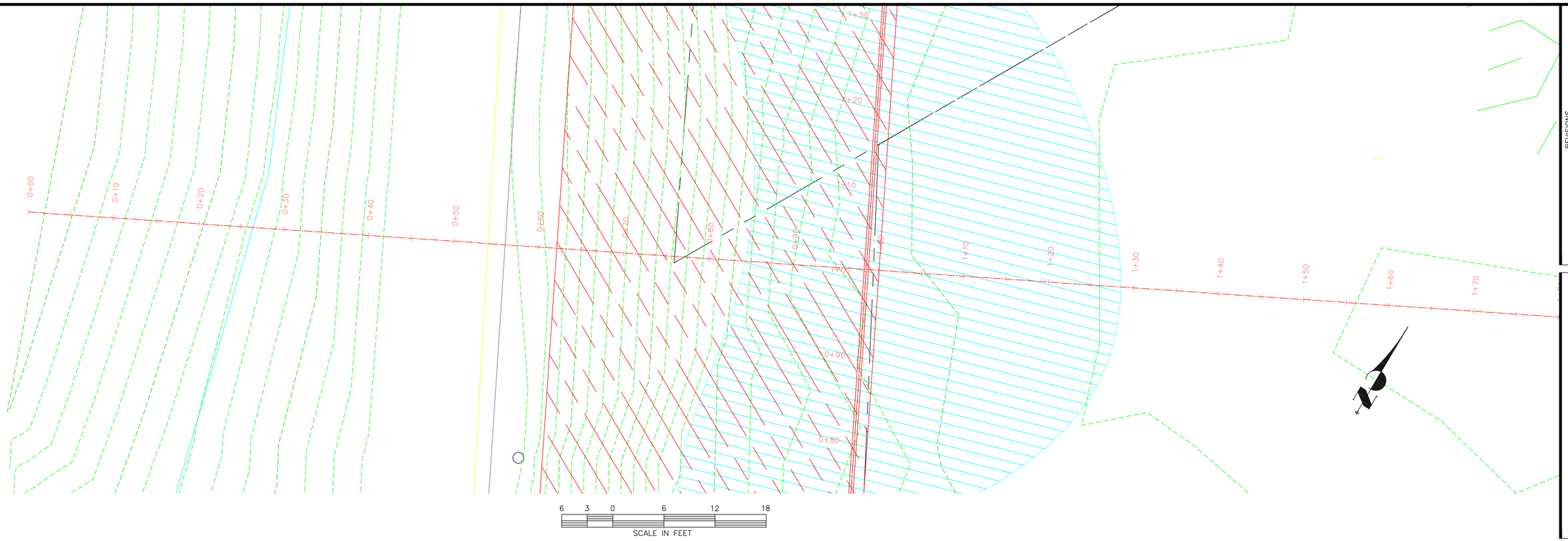
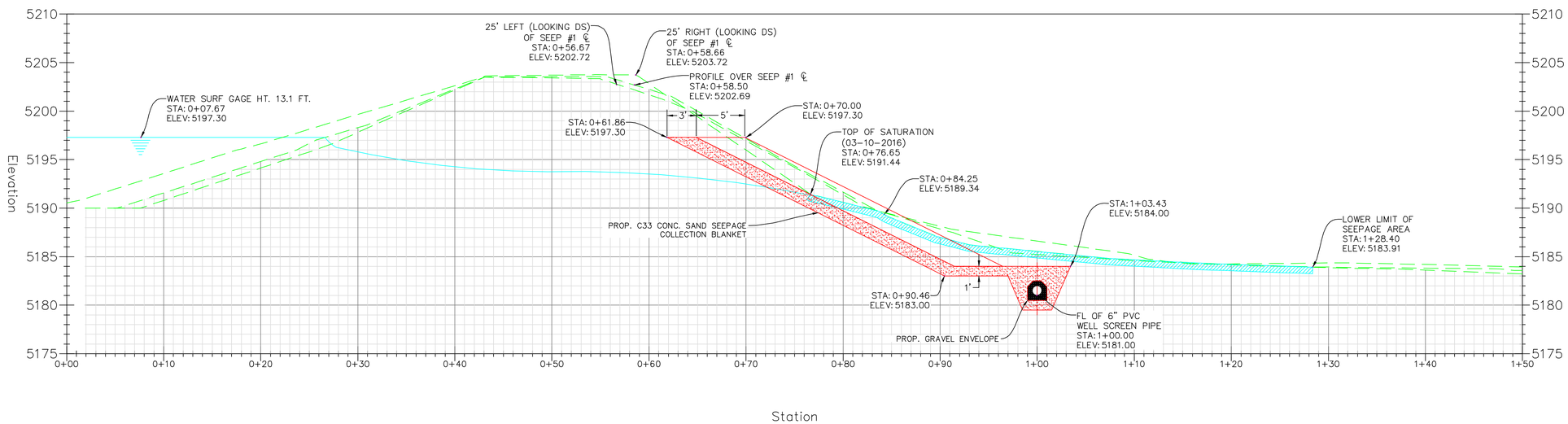


1 PLAN VIEW OF CENTERLINE OF SEEP 1 (LEFT OF OUTLET)

Scale: 1"=6'H, 1"=6' V



2 PROFILE VIEW OF CENTERLINE OF SEEP 1 (LEFT OF OUTLET)

Scale: 1"=6'H, 1"=6' V

6 3 0 6 12 18
SCALE IN FEET

PRELIMINARY
NOT FOR CONSTRUCTION

C-_____

REVISIONS		
DATE	DESCRIPTION	BY

GAUTHIERE ENGINEERING, INC.
2157 Buena Vista Drive
Greeley, Colorado 80634
Office (970) 330-0855 Cell (970) 302-0039

DESIGNED	JGG
DRAWN	JGG
CHECKED	JGG

REGISTERED PROFESSIONAL ENGINEER 22136 STATE OF COLORADO
John D. Gauthiere 03/01/2016

DIXON DITCH AND RESERVOIR CO.
DIXON RESERVOIR (DAMID 030124)
DAM IMPROVEMENT PROJECT
SEEP #1 FILTER BLANKET AND DRAIN

PROJECT NO.	—
SCALE	HORIZ.: AS SHOWN VERT.: NA
DATE	03-01-2016
SHEETS	15
SHEET	9

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
2150 Centre Ave., Building A, Suite-116
Fort Collins, CO 80526

16 September 2015

Doug Kokes
Paul Rupp
John Henry

RE: Dixon Reservoir Irrigation System Analysis

We initially met on 11 August 2015 at the City of Fort Collins maintenance facility located at Spring Canyon Park. Doug gave a tour of the key features of the Dixon Reservoir gravity irrigation system – from the Dixon Reservoir to the pipeline that supplies water back into the original ditch on the east side of the park.

The intent of the meeting and field tour was to gain a basic understanding of the components and the operation and function of the system and to discuss its apparent inability to deliver adequate flows to all of its members.

As a civil engineer and the technician in the Natural Resources Conservation Service (NRCS) Fort Collins field office, I appreciated the call for assistance with this engineering challenge.

On 13 August, I was able to survey key points along the irrigation route. The effort focused on getting hydraulically sensitive transition points along the route from the Dixon Reservoir headgate to the dividing box structure just outside the maintenance facility at the park. From the elevation of the pipeline just outside the park, I surmised the weak link in the system was upstream. Data included top elevations of the various pipe segments and water control structures (i.e. cleanout box structures and manhole/junction vaults) as well as the pipeline route via ground shots of the siphon between cleanout-2 and -3. Bottom (invert) elevations for each pipe segment were obtained from a top-of-structure reading and the use of a measuring tape since most structures have safety grate covers. From structure and top/invert measurements, estimated pipe inside diameters were calculated.

System components:

(Ref. Dixon Reservoir Irrigation plan view w/aerial photo underlay)

- 10" headgate at Dixon Reservoir, location estimated at water level gage reading of 0.0'
- 94' of 10" plastic pipe
- Open pond area (approx. 68' in length); note: pond area includes a 12" PVC outlet pipe
- Parshall measurement flume (9" throat)
- Cleanout-1 (CO-1) box structure with safety grate, 18" outlet pipe
- 150' of 18" plastic pipe under trail
- Cleanout-2 (CO-2) box structure with safety grate, 18" inlet pipe
- 18" pipe (unknown length) exiting CO-2
- ~575' of 12" pipe siphon system (pipe material estimated to be steel based on exposed pipe segment near CO-3)

    - Pipe vent – estimated start of downward dog-leg elbow of siphon pipe
    - Pipe vent at creek crossing – estimated low-point of siphon pipe
    - Pipe vent across creek – estimated end of upward dog-leg elbow of siphon pipe
    - 12" steel pipe dog-leg elbow up from unknown creek crossing to former contour ditch
- Cleanout-3 (CO-3) box structure with safety grate, 12" inlet pipe, 18" outlet pipe
- ~4,270' of 18" plastic pipe – replaced the original open contour ditch
- ~1,485' of 12" pipe; start of newer segment of pipeline system
    - Cleanout-4 structure with safety grate, 18" pipe inlet and 12" pipe outlet
    - Manhole structure located along side of S. Overland Trail road
    - Dividing Box structure and vault located at Spring Canyon Park
- ~2,350' of 12" pipe through park that discharges water into original irrigation ditch (***not surveyed***)

Analysis.
The raw survey data and notes were adjusted to create a pipeline route plan view, a top of pipe/structure profile, and a pipeline invert profile (estimated).

The intent of a hydraulic analysis was to determine what section is limiting the flow, estimate the capacity of the system as it currently operates, and then evaluate what improvements could help it function at a level more compatible to the needs and goals of its members.

In simple terms, a hydraulic analysis looks at how much water can flow or be pushed through a given structure by a given amount of available pressure. One psi (pounds per square inch) of pressure is generated at the base of a 2.31 foot column of water, so 2.31 feet of hydraulic "head" equals 1.0 psi.

As water moves, energy (hydraulic pressure or head) is lost through surface friction along the sides of the conveyance structure and where the water is disrupted (i.e. pipe bends, entrances, exits, valves, measuring devices, and vents). The faster waters moves, the more resistance or friction is generated. A flow will decrease to where the friction losses equal the available hydraulic potential along an enclosed section of pipe.

A Hydraulic Grade Line (HGL) is the slope, or grade, along a conveyance system profile that shows the available energy relative to the elevations of the system. For a given flow rate through a pipeline, other than some entrance allowances, the HGL needs to remain above the top of the pipe. If the HGL dips below the pipe, that is where the friction losses become greater than the energy available to push that flow rate through that size pipe. To convey water, either the flow rate needs to be decreased and/or the available energy (HGL) needs to be raised.

Existing system.
The capacity of the existing system is an estimated flow rate of 1.6 cubic feet per second (cfs) which equates to 718 gallons per minute (gpm) or about 43,080 gallons per hour (gph). The limiting factor is the hydraulic energy at cleanout-2 available to push water through the siphon so that the HGL ends above the inlet pipe at cleanout-3. Right now, the elevation of the pond dictates the starting HGL, not the water level of the reservoir, which can be 10 to 15 feet higher during irrigation season. For more capacity, the siphon pipe needs to be enlarged and/or the available head pressure needs to be increased.

Refer to the "*1.6 cfs = existing system capacity*" charts profiling the HGL relative to the pipe segments and cleanout structures from station -1' to 940' and a more zoomed in version only to station 340' which details the HGL constrained by the top of CO-2.

System improvement.

From discussions with Paul Rupp, the Teft Acres Water Association (TEWA) has a contracted delivery point flow of 67,885 gallon per hour, which is 2.31 cfs. Based on three general reasons, I suggest the system capacity be increased to accommodate 2.6 cfs or roughly 12% more than the contracted delivery point flow. Reasons: **1)** there are likely some minor unknowns of the actual pipeline system that the survey and hydraulic analysis calculations did not gather or address; **2)** 2.6 cfs is the NCRS flow rate limit for a 10" pipeline based on a flow velocity of 5 feet per second (fps) – any higher flow would suggest upgrading the existing 10" headgate and pipeline through the reservoir embankment; and **3)** natural system degradation over time.

Two approaches to upgrading the system were evaluated; both options replace the existing Parshall flume measuring device with the use of an in-pipe flow meter. The attached McCrometer data sheet depicts an example of a meter that should work well for this application.

To capture, without limit, the potential water level of the reservoir, option one included a series of direct pipe connections from the 10" reservoir outlet pipe to the siphon pipe using the existing 18" pipe but not utilizing the open cleanout structures 1 and 2. The upside of this approach is maximum use of available hydraulic energy from the reservoir. The downside is a more complex construction of pipe joints and transitions and the lack of available system cleanout options until after the siphon.

Option 2 approached the need for more hydraulic head pressure at CO-2 by simply increasing the height of that structure and then addressing new height requirements of any structures upstream. Option 2 construction would mimic the existing system of using cleanout structures as the transitions between differing pipe segments/sizes.

Due to the sensed "simple and robust" constructability, operation, and maintenance of option 2, it is the only approach I carried forward for analysis and conceptual construction detail.

Analysis of Option 2.

Project construction summary.

1. Modify the existing 10" reservoir pipe concrete outlet apron into a new cleanout structure (CO-0) and similar to other cleanouts (incl. safety grate); elevation to be determined (TBD).
    a. If discharge into the pond is necessary (there is a 12" pipe outlet along the northeast side of the pond, possibly for pond drainage/maintenance), include a 12" head/slide gate in the side and bottom of CO-0.
    b. If not, just include a 3" drain pipe w/valve at base of CO-0.
2. Install a new 12" pipe in pond area between CO-0 and CO-1 with upward grade of ~0.2%.
    a. Install an in-pipe flow meter approx. 15'-20' from CO-1.
    b. To ensure full pipe flow through the meter, install a standard 11.25-degree elbow 6'from CO-1 so that the outlet invert elevation is above the top of the meter.
3. Remove Parshall flume.
4. Reconstruct CO-1 to accept new 12" inlet pipe and increase box height, elevation TBD.

5. Reconstruct CO-2 to increase box height, elevation TBD.

Hydraulic design process.

1. Set the HGL elevation for CO-3 at the top of the 12" inlet pipe.
2. With a flow rate of 2.6 cfs, calculate the required HGL at the inlet of CO-2.
3. With revised CO-2 HGL, calculate the required HGL at the inlet of CO-1.
4. With revised CO-1 HGL, calculate the required HGL at the inlet of CO-0.
5. With a CO-0 HGL, calculate the operational gage level at the reservoir headgate.
6. With HGLs for 2.6 cfs, set top of structures at new HGL plus 6" to 12" of freeboard.

Conclusion: New 2.6 cfs system elevations (incl. 0.75' of freeboard).

- Increase height of CO-2 by 4.1'.
- Increase height of CO-1 by 3.6'.
- Construct CO-0 with a top elevation 5.6' above the top of the 10" outlet pipe.
- New 12" pipe
    - Begin invert elevation at mid-point of the 10" CO-0 inlet pipe.
    - End invert elevation above the top of the 18" CO-1 outlet pipe.

Refer to the "*2.6 cfs = proposed system capacity*" charts profiling the HGL relative to the pipe segments and cleanout structures from station -1' to 940' and a more zoomed in version only to station 340' which details the HGL relative to the new/heightened cleanout structures.
Note: cleanout structures on chart include 9" freeboard above the revised Hydraulic Grade Line.

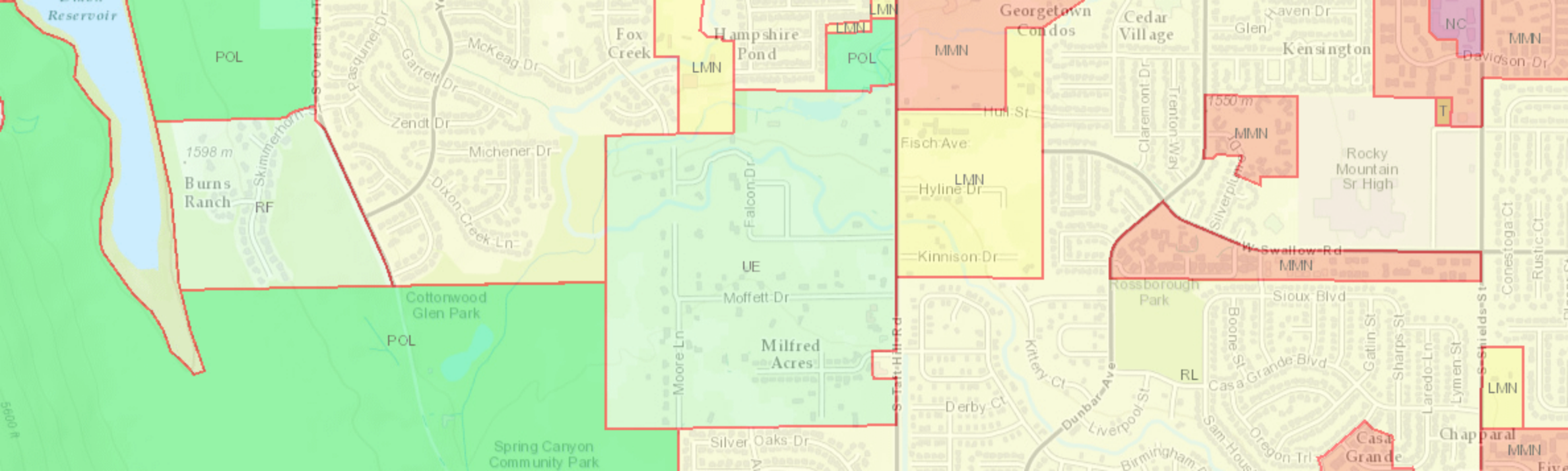
Photo Log.
Shows surveyed components of irrigation system along with some examples of in-pipe flow meter installations.

References/attachments.
Aerial plan view of irrigation system
Charts (2): 1.6 cfs = existing capacity
Charts (2): 2.6 cfs = proposed system capacity
McCrometer flow meter data sheet
Photo Log

If you need any clarification or have questions, I may be contacted at andy.piszkin@co.usda.gov or 970-295-5659.

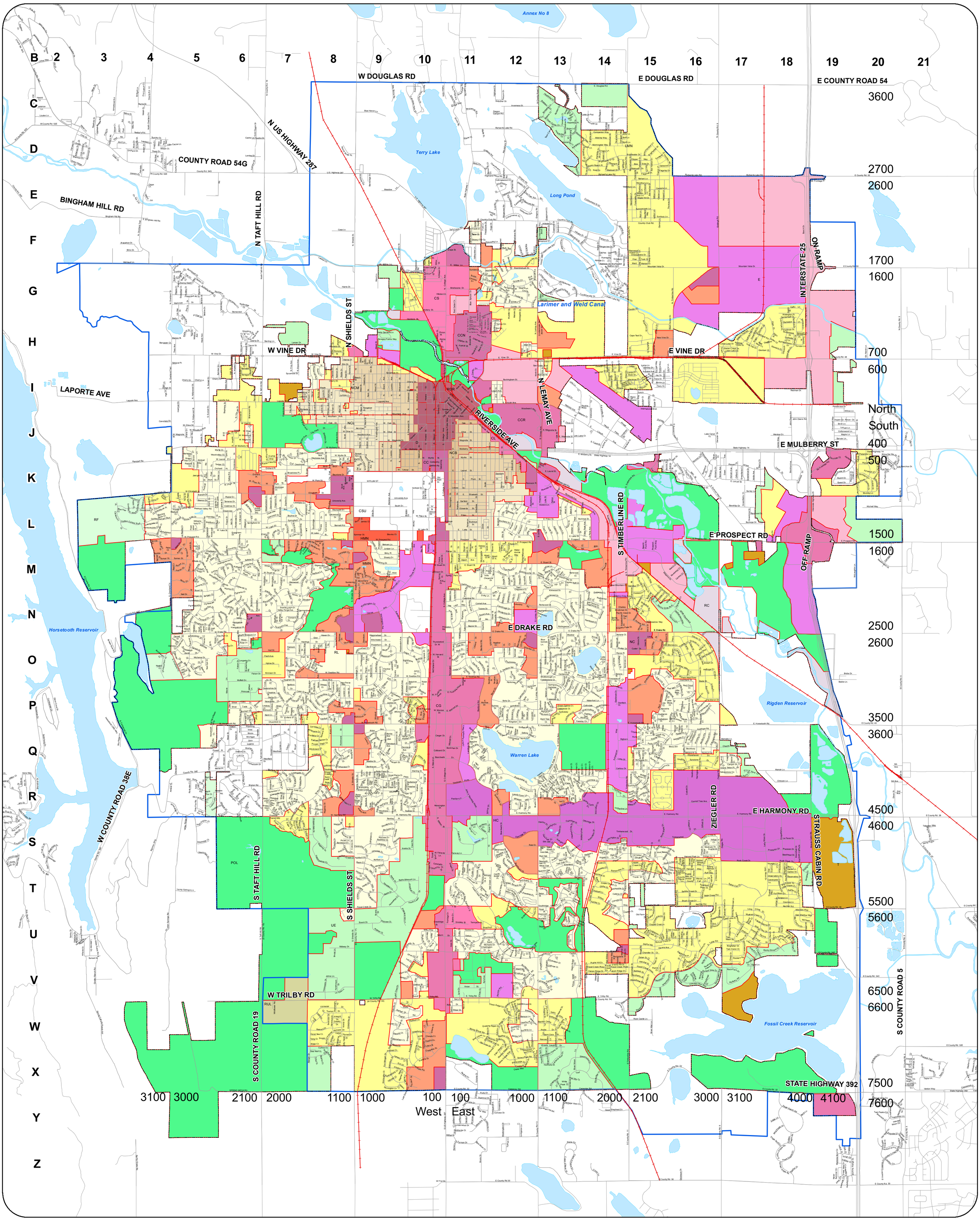
Very respectfully,

Andy Piszkin
Soil Conservation Technician
Fort Collins Field Office


Reservoir
POL
Burns Ranch
RF
1598 m
Skimmerhorn St
Overland Trl
Pasquinel Dr
Garrett Dr
McKeag Dr
Zendt Dr
Michener Dr
Dixon Creek Ln
Fox Creek
Hampshire Pond
LMN
POL
Georgetown Condos
MMN
Cedar Village
Raven Dr
Glen
Kensington
NC
Davidson Dr
T
1550 m
Hull St
Fisch Ave
Hyline Dr
Kinnison Dr
Claremont Dr
Trenton Way
Silverplume Ct
Rocky Mountain Sr High
W Swallow Rd
Rossborough Park
Sioux Blvd
Boone St
Casa Grande Blvd
Gatlin St
Sharps St
Laredo Ln
Lymen St
S Shields St
Conestoga Ct
Rustic Ct
Cottonwood Glen Park
UE
Moffett Dr
Falcon Dr
Moore Ln
S Taft Hill Rd
Milfred Acres
Silver Oaks Dr
Spring Canyon Community Park
Kittery Ct
Derby Ct
Dunbar Ave
Liverpool St
Sam Houston Dr
Oregon Trl
Birmingham
RL
Casa Grande
Chaparral
Five

City of Fort Collins

Zoning



N

W E

S

Scale 1:30,000

0 0.5 1 2 Miles

CITY OF FORT COLLINS
GEOGRAPHIC INFORMATION SYSTEM MAP PRODUCTS

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- City Limits
- Growth Management Area
- Water Features

City Zoning

- Community Commercial (CC)
- Community Commercial North College (CCN)
- Community Commercial Poudre River (CCR)
- General Commercial (CG)
- Limited Commercial (CL)
- Service Commercial (CS)
- CSU
- Downtown (D)
- Employment (E)
- Harmony Corridor (HC)
- Industrial (I)
- High Density Mixed-Use Neighborhood (HMN)
- Low Density Mixed-Use Neighborhood (LMN)
- Medium Density Mixed-Use Neighborhood (MMN)
- Neighborhood Commercial (NC)
- Neighborhood Conservation Buffer (NCB)
- Neighborhood Conservation Low Density (NCL)
- Neighborhood Conservation Medium Density (NCM)
- Public Open Lands (POL)
- River Conservation (RC)
- River Downtown Redevelopment (RDR)
- Residential Foothills (RF)
- Low Density Residential (RL)
- Rural Lands District (RUL)
- Transition (T)
- Urban Estate (UE)

City of Fort Collins GIS

Amended: January 20, 2015
Printed: April 01, 2016