Water Supply Reserve Account – Grant and Loan Program
Water Activity Summary Sheet
Agenda Item 23.i.

Applicant: Green Ditch Company (City of Boulder is majority shareholder)

Water Activity Name: Green Ditch Diversion Rehabilitation and Fish Passage Project

Water Activity Purpose: Consumptive and Non-consumptive Structural Water Project

County: Gunnison

Drainage Basin: South Platte

Water Source: Boulder Creek

Amount Requested: $245,000

Source of Funds: South Platte Basin ($25,000) and Statewide Account ($220,000)

Matching Funds: $326,000 cash (cash match City of Boulder, US Fish and Wildlife Service, and Boulder Flycasters). Green Ditch Company providing and additional $100,000 for temporary repair to allow for irrigation in 2014. Green Ditch Company also holds an emergency CWCB loan for $505,000.

Staff Recommendation
Staff recommends approval upon the condition of providing the additional documentation specified below in Issues/Additional Needs section of up to $25,000 from the South Platte Basin account and $220,000 from the Statewide account to help fund the Green Ditch Diversion Rehabilitation and Fish Passage Project.

Water Activity Summary:
The September 2013 flood caused significant damage to the reach of Boulder Creek that includes the Green Ditch Diversion. The creek found a new path through a wetland complex, and it no longer flows to the Green Ditch headgate. The proposed project will reconstruct the Green Ditch diversion structure at a point approximately 1000 feet upstream of the existing point of diversion. The project will involve significant work to relocate the Boulder Creek channel, stabilize channel banks, and construct boulder cross vanes to direct flow into the ditch.

Discussion:
The diversion reconstruction project will serve as a valuable demonstration project. It incorporates objectives of the CWCB Watershed and Stream Protection Program. These objectives include reconstruction of diversion structures to improve: sediment transport, stream connectivity (longitudinally and laterally), flood resiliency, fish passage, and recreation opportunities.

The South Platte Roundtable identified the Boulder Creek reach that includes the Green Ditch Diversion as an Environmental Focus Area in the South Platte Basin Non-consumptive Needs Assessment. Boulder Creek from Highway 36 to the St. Vrain Creek confluence is important "habitat for plains fish that are listed as State threatened and endangered or species of concern" as well as providing a "municipal recreational corridor".

The CWCB holds an instream flow water right on Boulder Creek that includes the project reach. The City of Boulder donated senior water rights to maintain instream flows in this reach.

Issues/Additional Needs:
Please provide the following additional detail:

- Geomorphic monitoring that conforms to CWCB standards should be incorporated to the scope of work.

- All proposed river channel work shall conform to the CWCB Rules and Regulations for Regulatory Floodplains in Colorado.

Staff Recommendation:
Staff recommends approval upon the condition of providing the additional documentation specified below in Issues/Additional Needs section of up to $25,000 from the South Platte Basin account and $220,000 from the Statewide account to help fund the Green Ditch Diversion Rehabilitation and Fish Passage Project.

All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and will help promote the development of a common technical platform.

In accordance with the revised WSRA Criteria and Guidelines, staff would like to highlight additional reporting and final deliverable requirements. The specific requirements are provided below.

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the scope of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

Engineering: All engineering work (as defined in the Engineers Practice Act (§12-25-102(10) C.R.S.)) performed under this grant shall be performed by or under the responsible charge of professional engineer licensed by the State of Colorado to practice Engineering.

Craig Godbout, Program Manager
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, Colorado 80203
Craig.godbout@state.co.us

January 23, 2014

The South Platte Basin roundtable underwent an evaluation and approval process of the Green Ditch Diversion Rehabilitation and Fish Passage Project. On December 20, 2013, the project was presented to the South Platte Roundtable Needs Committee where it received a favorable recommendation.

On January 14, 2014 the project was presented to the full South Platte Basin Roundtable. The contracting agency for the project will be the Green Ditch. The roundtable evaluation included a review and discussion of the project, definition of the project scope and budget, and the identification of the project beneficiaries. . It was determined that this project helps meet many of the key goals of the South Platte Nonconsumptive Needs Assessment (NCNA).

A motion was made and seconded to approve the proposed project for $25,000 from the South Platte Basin Account and recommended approval to the Colorado Water Conservation Board for an additional $220,000 from the Statewide Account. A quorum of the roundtable unanimously approved the motion. Please call me with any questions that you may have regarding the South Platte Basin roundtable meeting or the project.

Sincerely,

Sean T. Cronin
Chair, South Platte Basin Roundtable

COLORADO WATER CONSERVATION BOARD

WATER SUPPLY RESERVE ACCOUNT APPLICATION FORM

Today's Date: 01/06/2014

Green Ditch Diversion Rehabilitation and Fish Passage Project

Name of Water Activity/Project

Green Ditch Company

Name of Applicant

South Platte Basin Roundtable

Approving Basin Roundtable(s)
(If multiple basins specify amounts in parentheses.)

Amount from Statewide Account: 220,000

Amount from Basin Account(s): 25,000

Total WSRA Funds Requested: 245,000

FEIN : 84-1530735

Application Content

Required Exhibits

A. Statement of Work, Budget, and Schedule
B. Project Map
C. As Needed (i.e. letters of support, photos, maps, etc.)

Appendices – Reference Material

1. Program Information
2. Insurance Requirements
3. WSRA Standard Contract Information (Required for Projects Over $100,000)
4. W-9 Form (Required for All Projects Prior to Contracting)

Instructions

To receive funding from the Water Supply Reserve Account (WSRA), a proposed water activity must be approved by the local Basin Roundtable **AND** the Colorado Water Conservation Board (CWCB). The process for Basin Roundtable consideration and approval is outlined in materials in Appendix 1.

Once approved by the local Basin Roundtable, the applicant should submit this application **with a detailed statement of work including budget and schedule as Exhibit A** to CWCB staff by the application deadline.

WSRA applications are due with the roundtable letter of support 60 calendar days prior to the bi-monthly Board meeting at which it will be considered. Board meetings are held in January, March, May, July, September, and November. Meeting details, including scheduled dates, agendas, etc. are posted on the CWCB website at: http://cwcb.state.co.us Applications to the WSRA Basin Account are considered at every board meeting, while applications to the WSRA Statewide Account are only considered at the March and September board meetings.

When completing this application, the applicant should refer to the WSRA Criteria and Guidelines available at: http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Documents/WSRACriteriaGuidelines.pdf

The application, statement of work, budget, and schedule **must be submitted in electronic format** (Microsoft Word or text-enabled PDF are preferred) and can be emailed or mailed on a disk to:

Craig Godbout - WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
Craig.godbout@state.co.us

If you have questions or need additional assistance, please contact Craig Godbout at: 303-866-3441 x3210 or craig.godbout@state.co.us.

Water Supply Reserve Account – Application Form
Revised October 2013

Part I. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Green Ditch Company

Mailing address: 229 Terry Street
Longmont, CO 80501

FEIN #: 84-1530735

Primary Contact: Anne Smith Position/Title: President

Email: annesmith@ertlinc.com

Phone Numbers: Cell: 720-308-8739 Office: 303-772-0628

Alternate Contact: Todd Doherty Position/Title: Water Resources Adm.

Email: dohertyt@bouldercolorado.gov

Phone Numbers: Cell: 303-518-4741 Office: 303-413-7641

2. Eligible entities for WSRA funds include the following. What type of entity is the Applicant?

[ ] Public (Government) – municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities and the local entity should be the grant recipient. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.

[ ] Public (Districts) – authorities, Title 32/special districts, (conservancy, conservation, and irrigation districts), and water activity enterprises.

[x] Private Incorporated – mutual ditch companies, homeowners associations, corporations.

[ ] Private individuals, partnerships, and sole proprietors are eligible for funding from the Basin Accounts but not for funding from the Statewide Account.

[ ] Non-governmental organizations – broadly defined as any organization that is not part of the government.

3. Provide a brief description of your organization

The Green Ditch Company owns and operates an irrigation system in Boulder County, Colorado, utilizing water diverted from Boulder Creek, under a water right adjudicated in 1862. The Company owns, controls, maintains and operates an irrigation ditch, laterals, headgates, flumes, underground conduits, dividing boxes, irrigation water rights and water right decrees, and other property of a complete irrigation system.

A Board of Directors consisting of 5 members is elected each year for one year terms. The Ditch Supervisor oversees all ditch operations as authorized by the Board of Directors.

4. If the Contracting Entity is different then the Applicant (Project Sponsor or Owner) please describe the Contracting Entity here.

N/A

5. Successful applicants will have to execute a contract with the CWCB prior to beginning work on the portion of the project funded by the WSRA grant. In order to expedite the contracting process the CWCB has established a standard contract with provisions the applicant must adhere to. A link to this standard contract is included in Appendix 3. Please review this contract and check the appropriate box.

[x] The Applicant will be able to contract with the CWCB using the Standard Contract

[ ] The Applicant has reviewed the standard contract and has some questions/issues/concerns. Please be aware that any deviation from the standard contract could result in a significant delay between grant approval and the funds being available.

6. The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant.

The Green Ditch does not have any TABOR issues that may affect the applicant.

Part II. - Description of the Water Activity/Project

1. What is the primary purpose of this grant application? (Please check only one)

x	Nonconsumptive (Environmental or Recreational)
x	Agricultural
	Municipal/Industrial
	Needs Assessment
	Education
	Other Explain:

2. If you feel this project addresses multiple purposes please explain.

Project is designed to renovate a ditch diversion structure while adding providing for fish passage and boater safety.

3. Is this project primarily a study or implementation of a water activity/project? (Please check only one)

	Study	x	Implementation

4. To catalog measurable results achieved with WSRA funds can you provide any of the following numbers?

	New Storage Created (acre-feet)
	New Annual Water Supplies Developed, Consumptive or Nonconsumptive (acre-feet)
	Existing Storage Preserved or Enhanced (acre-feet)
14.9 mi	Length of Stream Restored or Protected (linear feet)
	Length of Pipe/Canal Built or Improved (linear feet)
	Efficiency Savings (acre-feet/year OR dollars/year – **circle one**)
x	Area of Restored or Preserved Habitat (acres)
x	Other -- Explain: Preserve irrigation on approx 1300 acres

4. To help us map WSRA projects please include a map (Exhibit B) and provide the general coordinates below:

Latitude: 40.037332 Longitude: 105.203287

5. Please provide an overview/summary of the proposed water activity (no more than one page). Include a description of the overall water activity and specifically what the WSRA funding will be used for. A full **Statement of Work** with a detailed budget and schedule is required as **Exhibit A** of this application.

Introduction

During the unprecedented flood of September 2013, the Green Ditch Company (Company) received significant damage to its system. The Company has an appropriation date of June 2, 1882 and serves approximately 1,300 irrigated acres in Boulder County between the City of Boulder and the Town of Erie and currently serves seven shareholders. In addition to irrigation water for farms and ranches, the water is also used to irrigate Boulder County Open Space, agricultural property preserved under conservation easements by the City of Boulder, small farms and for snowmaking activities at Eldora Mountain Resort.

During the 2013 flood event Boulder Creek was relocated at this location and water no longer flows to the Green Ditch headgate. While the diversion structure was not significantly impacted by the floodwater due to the river moving away during the storm, significant work is need to restore its ability to divert water for the upcoming irrigation season. It is important to note that the old structure currently has a diversion dam spanning the length of the (old) channel and swept the flows at low flow conditions, creating a barrier for fish passage. It is also important to note that the CWCB holds an important instream flow water right (1-90CW193) on Boulder Creek through this reach. This is one of the first ISF acquisitions, where the City of Boulder donated valuable senior water rights to the CWCB to maintain instream flows in Boulder Creek.

This project will reconstruct the Green Ditch diversion structure on Boulder Creek. It will rehabilitate the headworks and instream diversion structure for the ditch, while incorporating a fish passage to provide safe boating passage and access to upstream spawning areas for plains fish species.

The South Platte Basin Roundtable examined their collective environmental and recreational data and utilized a stakeholder process to establish environmental and recreational focus areas. Boulder Creek from Highway 36 to its confluence with Saint Vrain Creek was selected as an Environmental Focus Area in the South Platte Basin Nonconsumptive Needs Assessment. It was found to be important "habitat for plains fish that are listed as State threatened and endangered or species of concern" as well as providing a "municipal recreational corridor." Rehabilitation of the Green Ditch irrigation diversion structure on Boulder Creek, with a fish passage, is important to the future survival of these species.

The Green Ditch diversion is located on Boulder Creek just downstream of the

South Boulder Creek confluence east of the City of Boulder. It is the largest remaining high head dam structure left on Boulder Creek in a 14.9 mile stream reach between the canyon mouth at Anderson Ditch to US 287. A map of the proposed project area is included in Exhibit C.

WSRA funding will be used to construct a roughened channel rock ramp fish passage, a diversion structure that can operate without flashboards, and a headworks that has operable water control for the sand sluice and headgate. One of the primary purposes of having operable water control is to direct low flow water to the fish passage during critical times of the year.

Project partners include the City of Boulder Parks and Open Space Department, Green Ditch Company, and the Boulder Flycasters Chapter of Colorado Trout Unlimited. The Green Ditch is a mutually owned ditch company with a board of directors consisting of five directors representing the stockholders. The City of Boulder Open Space and Mountain Parks owns 80 percent of the ditch, with the remaining shares held by private landowners. The Green Ditch has several decreed rights, the most senior being a September 15, 1862 decree allowing the diversion of 34.58 cubic-feet per second (cfs) of water from Boulder Creek.

Part III. – Threshold and Evaluation Criteria

1. Describe how the water activity meets these **Threshold Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines.)

   a) The water activity is consistent with Section 37-75-102 Colorado Revised Statutes.[1]

Rehabilitation of the Green Ditch and creation of a fish passage does in no way supersede, abrogate, or otherwise impair any other water right(s). The Green Ditch will continue to receive its full allotment of water as set forth in its water rights decree. Further, nothing in this project repeals or in any manner amends the existing water rights adjudication system. The renovated structure will direct low flow water to the fish passage when appropriate. This does not diminish, impair, or cause injury to any downstream water right(s).

   b) The water activity underwent an evaluation and approval process and was approved by the Basin Roundtable (BRT) and the application includes a description of the results of the BRTs evaluation and approval of the activity. At a minimum, the description must include the level of agreement reached by the roundtable, including any minority opinion(s) if there was not general agreement for the activity. The description must also include reasons why general agreement was not reached (if it was not), including who opposed the activity and why they opposed it. Note- If this information is included in the letter from the roundtable chair simply reference that letter.

On December 20, 2013, this proposal was presented to the South Platte BRT Needs Committee. This proposal was approved for presentation to the roundtable at our January meeting with the request to provide the responses to the following questions:

[1] 37-75-102. Water rights - protections. (1) It is the policy of the General Assembly that the current system of allocating water within Colorado shall not be superseded, abrogated, or otherwise impaired by this article. Nothing in this article shall be interpreted to repeal or in any manner amend the existing water rights adjudication system. The General Assembly affirms the state constitution's recognition of water rights as a private usufructuary property right, and this article is not intended to restrict the ability of the holder of a water right to use or to dispose of that water right in any manner permitted under Colorado law. (2) The General Assembly affirms the protections for contractual and property rights recognized by the contract and takings protections under the state constitution and related statutes. This article shall not be implemented in any way that would diminish, impair, or cause injury to any property or contractual right created by intergovernmental agreements, contracts, stipulations among parties to water cases, terms and conditions in water decrees, or any other similar document related to the allocation or use of water. This article shall not be construed to supersede, abrogate, or cause injury to vested water rights or decreed conditional water rights. The General Assembly affirms that this article does not impair, limit, or otherwise affect the rights of persons or entities to enter into agreements, contracts, or memoranda of understanding with other persons or entities relating to the appropriation, movement, or use of water under other provisions of law.

1. **Outline how this project provides significant benefit to targeted fish populations and is part of a plan to improve fish passage throughout the targeted area. Is it part of the Non-consumptive needs focus area and or attributes?**

The South Platte Basin Roundtable examined their collective environmental and recreational data and utilized a stakeholder process to establish environmental and recreational focus areas. Boulder Creek from Highway 36 to its confluence with Saint Vrain Creek was selected as an Environmental Focus Area in the South Platte Basin Nonconsumptive Needs Assessment. It was found to be important "habitat for plains fish that are listed as State threatened and endangered or species of concern" as well as providing a "municipal recreational corridor." Rehabilitation of the Green Ditch irrigation diversion structure on Boulder Creek, with a fish passage, is important to the future survival of these species.

The Green Ditch diversion is located on Boulder Creek just downstream of the South Boulder Creek confluence east of the City of Boulder. It is the largest remaining high head dam structure left on Boulder Creek in a 14.9 mile stream reach between the canyon mouth at Anderson Ditch to US 287. A map of the proposed project area is included in Exhibit C.

2. **Outline how this project qualifies for statewide funding and provide examples where statewide funding has been provided for similar projects in other basins.**

This project meets numerous criteria in the Statewide Account Evaluation Criteria which are addressed in the following section. The Statewide Account evaluation criteria favors projects which promote collaboration, cooperation in meeting water management goals and identified needs. The proposed project is a multiple purpose project supported by and agricultural, municipal, recreational and environmental interests. While it is important to rebuild the Green Ditch to allow for continued diversions of its decreed water rights, the Company supports the concept of rebuilding stronger and smarter than before while helping to ensuring the long-term sustainability of agriculture and natural environment for the Boulder Creek watershed and by extension for the South Platte basin. This multi-benefit project will provide for infrastructure upgrades while providing benefits such as the protection of open space, wildlife habitat, and outdoor recreation activities.

Per the South Platte BRT Needs Assessment request, a list of other similar projects approved by the CWCB for Statewide Funds is attached to this application. The list includes diversion reconstruction projects similar to this proposal as well as a variety of nonconsumptive projects which may be site specific but include values identified in the Statewide Evaluation Criteria.

c) The water activity meets the provisions of Section 37-75-104(2), Colorado Revised Statutes.[2] The Basin Roundtable Chairs shall include in their approval letters for particular WSRA grant applications a description of how the water activity will assist in meeting the water supply needs identified in the basin roundtable's consumptive and/or non-consumptive needs assessments.

This project is a multiple purposes project seeking to meet agricultural, environmental and recreational water needs in the South Platte Basin. The South Platte Basin Roundtable has identified Boulder Creek from Highway 36 to its confluence with Saint Vrain Creek as an Environmental Focus Area in the South Platte Basin Nonconsumptive Needs Assessment. It was found to have important "habitat for plains fish listed as State threatened and endangered or species of concern," as well as providing a "municipal recreational corridor."

The following State threatened and endangered of species of concern were identified in this reach of Boulder Creek: Brassy minnow, Common shiner, Iowa darter, Lake chub and Redbelly dace. Other species associated with the riparian habitat of Boulder Creek include the Common garter snake, Preble's meadow jumping mouse, and Northern leopard frog.

Rehabilitation of the Green Ditch irrigation diversion structures on Boulder Creek, to provide fish and safe boating passage, is important to the future survival of these species.

Historically, plains fishes ranged far upstream and downstream to take advantage of habitat for spawning, refuge from predators or harsh environmental conditions, or seasonal abundances of food. By preventing these fish from moving upstream, diversion structures effectively severe the connectivity of these prairie stream ecosystems, increasing the risk of local extinction of these species (Ficke and Myrick 2007).

The City of Boulder Open Space and Mountain Parks Department has completed fish passage projects on three similar structures on South Boulder Creek. The Green Ditch diversion is the largest remaining high head dam structure left on Boulder Creek from the mouth of Boulder Canyon to US 287. With completion of this project, barriers to movement of aquatic organisms due to diversion dams would be eliminated from a 14.9 mile reach of Boulder Creek.

[2] 37-75-104 (2)(c). Using data and information from the Statewide Water Supply Initiative and other appropriate sources and in cooperation with the on-going Statewide Water Supply Initiative, develop a basin-wide consumptive and nonconsumptive water supply needs assessment, conduct an analysis of available unappropriated waters within the basin, and propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate. Basin Roundtables shall actively seek the input and advice of affected local governments, water providers, and other interested stakeholders and persons in establishing its needs assessment, and shall propose projects or methods for meeting those needs. Recommendations from this assessment shall be forwarded to the Interbasin Compact Committee and other basin roundtables for analysis and consideration after the General Assembly has approved the Interbasin Compact Charter.

d) Matching Requirement: For requests from the **Statewide Fund**, the applicants will be required to demonstrate a 25 percent (or greater) match of the total grant request from the other sources, including by not limited to Basin Funds. A minimum match of 5% of the total grant amount shall be from Basin funds. A minimum match of 5% of the total grant amount must come from the applicant or 3rd party sources. Sources of matching funds include but are not limited to Basin Funds, in-kind services, funding from other sources, and/or direct cash match. Past expenditures directly related to the project may be considered as matching funds if the expenditures occurred within 9 months of the date the application was submitted to the CWCB. Please describe the source(s) of matching funds. (NOTE: These matching funds should also be reflected in your Detailed Budget in **Exhibit A** of this application)

The applicant and/or supporters will provide significant grant matching funds and the Basin Fund request exceeds the minimum 5% of the total grant amount. The City of Boulder Open Space and Mountain Parks has committed up to $50,000 in matching funds and the Boulder Flycasters (Trout Unlimited) has committed up to $5,000 for the project.

2. For Applications that include a request for funds from the **Statewide Account**, describe how the water activity/project meets all applicable **Evaluation Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines and repeated below.) Projects will be assessed on how well they meet the Evaluation Criteria. **Please attach additional pages as necessary.**

Evaluation Criteria – the following criteria will be utilized to further evaluate the merits of the water activity proposed for funding from the Statewide Account. In evaluation of proposed water activities, preference will be given to projects that meet one or more criteria from each of the three "tiers" or categories. Each "tier" is grouped in level of importance. For instance, projects that meet Tier 1 criteria will outweigh projects that only meet Tier 3 criteria. WSRA grant requests for projects that may qualify for loans through the CWCB loan program will receive preference in the Statewide Evaluation Criteria if the grant request is part of a CWCB loan/WSRA grant package. For these CWCB loan/WSRA grant packages, the applicant must have a CWCB loan/WSRA grant ratio of 1:1 or higher. Preference will be given to those with a higher loan/grant ratio.

Tier 1: Promoting Collaboration/Cooperation and Meeting Water Management Goals and Identified Water Needs

a. The water activity addresses multiple needs or issues, including consumptive and/or non-consumptive needs, or the needs and issues of multiple interests or multiple basins. This can be demonstrated by obtaining letters of support from other basin roundtables (in addition to an approval letter from the sponsoring basin).

This project is a multi-purpose, collaborative project which is designed to meet multiple water management goals and identified needs of the South Platte Basin. The project is supported by agricultural, municipal, recreational and environmental interests. While it is important to rebuild the Green Ditch to allow for continued diversions of its decreed water rights, the Company supports the concept of rebuilding stronger and smarter than before while helping to ensuring the long-term sustainability of agriculture and natural environment for the Boulder Creek watershed and by extension for the South Platte basin. This multi-benefit project will provide for infrastructure upgrades while providing benefits such as the protection of open space, wildlife habitat, and outdoor recreation activities.

b. The number and types of entities represented in the application and the degree to which the activity will promote cooperation and collaboration among traditional consumptive water interests and/or non-consumptive interests, and if applicable, the degree to which the water activity is effective in addressing intrabasin or interbasin needs or issues.

Numerous entities including non-profit, governmental and agricultural interests are working collaboratively to achieve multiple objectives.

c. The water activity helps implement projects and processes identified as helping meet Colorado's future water needs, and/or addresses the gap areas between available water supply and future need as identified in SWSI or a roundtable's basin-wide water needs assessment.

The South Platte Basin Roundtable has identified Boulder Creek from Highway 36 to its confluence with Saint Vrain Creek as an Environmental

Focus Area in the South Platte Basin Nonconsumptive Needs Assessment. It was found to have important "habitat for plains fish listed as State threatened and endangered or species of concern," as well as providing a "municipal recreational corridor."

The following State threatened and endangered of species of concern were identified in this reach of Boulder Creek: Brassy minnow, Common shiner, Iowa darter, Lake chub and Redbelly dace. Other species associated with the riparian habitat of Boulder Creek include the Common garter snake, Preble's meadow jumping mouse, and Northern leopard frog.

Rehabilitation of the Green Ditch irrigation diversion structures on Boulder Creek, to provide fish and safe boating passage, is important to the future survival of these species.

Historically, plains fishes ranged far upstream and downstream to take advantage of habitat for spawning, refuge from predators or harsh environmental conditions, or seasonal abundances of food. By preventing these fish from moving upstream, diversion structures effectively severe the connectivity of these prairie stream ecosystems, increasing the risk of local extinction of these species.

The City of Boulder Open Space and Mountain Parks Department has completed fish passage projects on three similar structures on South Boulder Creek. The Green Ditch diversion is the largest remaining high head dam structure left on Boulder Creek from the mouth of Boulder Canyon to US 287. With completion of this project, barriers to movement of aquatic organisms due to diversion dams would be eliminated from a 14.9 mile reach of Boulder Creek.

Tier 2: Facilitating Water Activity Implementation

d. Funding from this Account will reduce the uncertainty that the water activity will be implemented. For this criterion the applicant should discuss how receiving funding from the Account will make a significant difference in the implementation of the water activity (i.e., how will receiving funding enable the water activity to move forward or the inability obtaining funding elsewhere).

The Company has been approved for a CWCB Emergency Loan in the amount of $505,000. While this is sufficient to cover the costs of the project, the Company is requesting a grant to cover the "environmental" aspects of this alternative (project cost in excess of restoring the river back to pre-flood conditions). It is estimated that costs to restoring the river to pre-flood conditions are $250,000 which do not include environmental components. The request of the $245,000 ($220,000 Statewide, $25,000 South Platte Basin Funds) will assist in the funding of the environmental aspects of this project. If the Company were to take on the entire debt, the ditch assessments would quadruple from $200/share to over $800/share.

e. The amount of matching funds provided by the applicant via direct contributions, demonstrable in-kind contributions, and/or other sources demonstrates a significant & appropriate commitment to the project.

Through the commitment of the CWCB loan, grant matches by the City of Boulder and Boulder Flycasters, the Company and its partners are fully committed to this project.

Tier 3: The Water Activity Addresses Other Issues of Statewide Value and Maximizes Benefits

f. The water activity helps sustain agriculture & open space, or meets environmental or recreational needs.

This project will help sustain over 1300 irrigated acres, help protect the City of Boulders Open Space property (diversion structure and creek are on OSMP property), allow for fish passage for recreational and species of concern as well as allow for safe recreational boat passage. The South Platte NCNA identified this reach as one providing a "municipal recreational corridor."

g. The water activity assists in the administration of compact-entitled waters or addresses problems related to compact entitled waters and compact compliance and the degree to which the activity promotes maximum utilization of state waters.

This project ensures the irrigation of irrigable lands in the South Platte Basin, a valued utilization of state waters.

h. The water activity assists in the recovery of threatened and endangered wildlife species or Colorado State species of concern.

The project area is a "focus area" in the South Platte Basin Nonconsumptive Needs Assessment. It was found to have important "habitat for plains fish listed as State threatened and endangered or species of concern."

The following State threatened and endangered of species of concern were identified in this reach of Boulder Creek: Brassy minnow, Common shiner, Iowa darter, Lake chub and Redbelly dace. Other species associated with the riparian habitat of Boulder Creek include the Common garter snake, Preble's meadow jumping mouse, and Northern leopard frog.

Rehabilitation of the Green Ditch irrigation diversion structures on Boulder Creek, to provide fish and safe boating passage, is important to the future survival of these species.

i. The water activity provides a high level of benefit to Colorado in relationship to the amount of funds requested.

Considering the multiple benefits and partners as well as the financial commitment by the applicant and cooperators, we believe the project and funds are well leveraged and provide a high level of benefit to Colorado.

j. The water activity is complimentary to or assists in the implementation of other CWCB programs.

The CWCB holds an important instream flow water right (1-90CW193) on Boulder Creek through this reach. This is one of the first ISF acquisitions, where the City of Boulder donated valuable senior water rights to the CWCB to maintain instream flows in Boulder Creek. This project would improve the water dependent natural environment in which this instream flow seeks to protect. Further, the Company has also been approved for a CWCB Emergency

Loan to help pay for this project.

Part IV. – Required Supporting Material

1. **Water Rights, Availability, and Sustainability** – This information is needed to assess the viability of the water project or activity. Please provide a description of the water supply source to be utilized, or the water body to be affected by, the water activity. This should include a description of applicable water rights, and water rights issues, and the name/location of water bodies affected by the water activity.

The Green Ditch was decreed on June 2, 1882 in Civil Action 1306, in the District Court of Boulder County, Colorado. The Green Ditch diverts from the south bank of Boulder Creek at a point in the Southwest 1/4 of the Northwest 1/4 of the Southwest 1/4 of Section 23, Township 1 North, Range 70 West of the 6th P.M. Water is from Boulder Creek, tributary to St. Vrain Creek, a tributary to the South Platte River.

Appropriation Dates and Total Amounts Decreed to Structure
The Green Ditch was decreed in four separate priorities as follows:

(i) 34.58 cfs, with an appropriation date of September 15, 1862.
(ii) 34.58 cfs, with an appropriation date of May 1, 1863.
(iii) 34.58 cfs, with an appropriation date of May 1, 1864.
(iv) 34.58 cfs, with an appropriation date of May 1, 1865.

The decreed use for all of these rights is irrigation.

There are several Colorado Water Conservation Board-owned instream flow rights on Boulder Creek (See Table 1, below). Rehabilitation of the Green Ditch diversion structure will compliment the purpose of the appropriations by supporting fish migration within the stream reach. The fish passage structure will allow enhanced management of instream flows, particularly during critical low flow periods. Except for a one cubic feet per second (cfs) instream flow water right dating from 1862, the CWCB-owned instream flow water rights on Boulder Creek are very junior and are only in priority when there is a significant amount of water in the creek or very little water user demand. Rehabilitation of this diversion with the addition of the fish passage structure will concentrate flows in the fish way during low flows.

In 1990 and 1992, Boulder and the CWCB entered into a series of agreements through which the Boulder dedicated water rights and assigned interests in water to the CWCB for instream flow purposes on Boulder Creek (See Table 2, below). The dedication to the CWCB of water rights owned by the Boulder and commitments to releases of water from the city's storage reservoirs assists the CWCB in satisfying its junior instream flow rights by providing use of more senior water rights. The water rights Boulder provided for use by the CWCB had an estimated market value of greater than $12 million at the time of the dedication.

Table 1. Instream Flow Water Rights on Boulder Creek (2012)

Stream	Reach	Decree	Appropriation	Decree	Season

		Case No.	Date	Amount	
Boulder Creek	Broadway diversion structure to 75th Street	79CW308	6-1-1862	1.0 cfs	April 1 – October 31
Boulder Creek	Orodell gage to 75th Street	W-7636-74	10-1-1973	15.0 cfs	Year round
Boulder Creek	Confluence of North and Middle Boulder creeks to Orodell gage	94CW18	11-10-1993	6.0 cfs	November 1 – March 31
Boulder Creek	Confluence of North and Middle Boulder creeks to Orodell gage	94CW18	11-10-1993	15.0 cfs	April 1 – October 31

Table 2. Boulder water rights provided to the CWCB for instream flow use.

Water Right/Source	Appropriation Date	Stream Reach	Flow Amount	Season
Smith and Goss	11-15-1859	From Silver Lake Pipeline diversion to 75th Street	0.451 cfs	May 1- October 15
Anderson Ditch	10-1-1860	Same as above	May: 1.07 cfs June: 2.23 cfs July: 2.16 cfs August: 1.62 cfs September: 1.23 cfs	May 1- September 30
Harden Ditch	6-1-1862	Same as above	1.8 cfs	May 1- September 30
McCarty Ditch	6-1-1862	Same as above	0.64 cfs	May 1- September 30
Farmers Ditch	10-1-1862	Farmers Ditch headgate to 75th Street	12.17 cfs	May 1- September 30
Silver Lake Reservoir	9-6-1928 12-31-1941	Silver Lake Pipeline diversion to 75th Street	As needed to maintain 0.5 cfs below Silver Lake Pipeline diversion and voluntarily to maintain up to 15 cfs from Orodell to 75th Street from all sources	October 1- April 30
Boulder City Pipeline	2-9-1904	Lakewood Reservoir inlet to 75th Street	As needed to maintain 1.5 cfs below Lakewood Reservoir	November 1- April 30
Barker	5-15-1956	Orodell gage to	At the city's	

Reservoir	4-22-1966	75th Street	discretion to maintain up to 15 cfs from all sources	Year round

2. Please provide a brief narrative of any related studies or permitting issues.

An engineering/feasibility study was completed by Olsson Associates dated December 20, 2013 (attached). In this analysis, several alternatives were examined including: (1) keeping stream channel in its post-flood location and moving the diversion structure for the Green Ditch upstream and piping its decreed water to the former/original headgate and (2) repairing the breach and restoring Boulder Creek in its pre-flood channel. Due to the scouring of the streambed during the flood event, the headgate of the Green Ditch was left higher in elevation than Boulder Creek.

The recommended approach is to repair the breach, restore Boulder Creek to its pre-flood channel and to replace the old diversion structure with a modern diversion dam with fish passage components.

An engineering design study was completed in November 2011 by AMEC Earth and Environmental with GEI Consultants, Inc, titled Green Ditch Diversion Rehabilitation and Fishway Technical Specifications (attached). This report provides all engineering specifications for the project.

The Green Ditch Company will request an agricultural exemption for irrigation ditches from the Army Corps of Engineers under Section 404 permit. The Green Ditch Company will also apply to the City of Boulder under its wetland ordinance for an agricultural irrigation ditch maintenance waiver. Other regulatory compliance requirements will be pursued as necessary.

Full rehabilitation of the structure will allow for safe boater passage, as well as critical low flows to be diverted through the newly-created fish passage, supporting natural upstream and downstream migration of a variety of plains fish species. Renovation of the wing-wall will ensure water deliveries to irrigated agricultural lands under the ditch. It will also create a structure that is environmentally sustainable in the long-term.

3. Statement of Work, Detailed Budget, and Project Schedule

The statement of work will form the basis for the contract between the Applicant and the State of Colorado. In short, the Applicant is agreeing to undertake the work for the compensation outlined in the statement of work and

budget, and in return, the State of Colorado is receiving the deliverables/products specified. **Please note that costs incurred prior to execution of a contract or purchase order are not subject to reimbursement**. All WSRA funds are disbursed on a reimbursement basis after review invoices and appropriate backup material.

Please provide a detailed statement of work using the template in Exhibit A. Additional sections or modifications may be included as necessary. Please define all acronyms and include page numbers.

PROJECT COSTS & REVENUE SUMMARIES

Task	Cost
Repair Boulder Creek banks (breached area)	$321,576
Relocate channel sediment	$8,125
Repair bank at lake breach	$160,182
Installation of fish passage and headworks	$278,127
Repair Boulder Creek Banks (West Area)	$43,043
Total	**$811,053**
Revenue Source	
CWCB Emergency Loan	$530,000
FEMA (75% of cost to rebuild to pre-flood conditions)???	
WSRA Statewide Grant Request	$220,000
WSRA Basin Grant Request	$25,000
City of Boulder Matching Funds	$50,000
Boulder Flycasters (TU) Matching Funds	$5,000
Total Funds Available	**$830,000**

Schedule: Construction is expected to begin in winter 2014 and will be completed by summer/fall 2014.
Note: The CWCB/WSRA funds will not be used for contingency costs.

SUMMARY OF CONSTRUCTION COSTS BY TASK

Tasks	Costs
Repair Boulder Creek Banks	$257,261
Contingency	$64,315
Sub-total	**$321,576**
Relocate Channel and Ditch Sediment	$6,500
Contingency	$1,625
Sub-total	**$8,125**
Repair Lake Breach	$128,145
Contingency	$32,036
Sub-total	**$160,181**
Installation of fish passage and headworks	$222,502
Contingency	$55,625
Sub-total	**$278,127**
Repair Boulder Creek Banks (West Area)	$34,435
Contingency	$8,609
Sub-total	**$43,043**
Sub-total (w/o contingencies)	$648,843
Total contingency costs	$162,210
Total Costs	**$811,052**

Detailed Costs by Task

Green Ditch Irrigation Company
Alternative 1 - Repair Boulder Creek Banks
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$13,000	$13,000
2	Construction Surveying	LS	1	$2,000	$2,000
3	Water Control and Dewatering	LS	1	$13,000	$13,000
4	Traffic Control	LS	1	$1,000	$1,000
5	Clearing and Grubbing	LS	1	$2,000	$2,000
6	Erosion Control	LS	1	$10,000	$10,000
7	Excavation Cut/Fill Using On-Site Materials	CY	400	$5	$2,000
8	Excavation with Fill Using Off-Site Materials (Import)	CY	1,200	$40	$48,000
9	Type M Soil Riprap	CY	2,038	$55	$112,090
10	Un-Grouted Boulder Cutoff Wall (36-Inch)	LF	280	$100	$28,000
11	Spurs	EA	3	$500	$1,500
12	Topsoil Removal, Stockpiling, and Replacement	AC	1.25	$10,000	$12,500
13	Soil Preparation and Fine Grading	AC	1.25	$2,500	$3,125
14	Boulder County Seed Mix	AC	1.25	$4,000	$5,000
15	Hydromulch with Tackifier	AC	0.81	$5,000	$4,046
16	Erosion Control Blanket (Koirmat 700)	SY	2,133	$10	$21,333
17	Planting Allowance	LS	1	$10,000	$10,000
				Subtotal	$257,261
				25% Contingency	$64,315
				Total Cost	**$321,576**

Green Ditch Irrigation Company
Alternative 1 - Relocate Channel and Ditch Sediment
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$1,000	$1,000
2	Construction Surveying	LS	1	$1,000	$1,000
3	Water Control and Dewatering	LS	1	$500	$500
4	Traffic Control	LS	1	$500	$500
5	Clearing and Grubbing	LS	1	$500	$500
6	Erosion Control	LS	1	$500	$500
7	Excavation Cut/Fill Using On-Site Materials	CY	500	$5	$2,500
				Subtotal	$6,500
				25%	$1,625

	Contingency	
	Total Cost	**$8,125**

Green Ditch Irrigation Company
Alternatives 1 and 2 - Repair Lake Breach
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$6,000	$6,000
2	Construction Surveying	LS	1	$2,000	$2,000
3	Water Control and Dewatering	LS	1	$6,000	$6,000
4	Traffic Control	LS	1	$1,000	$1,000
5	Clearing and Grubbing	LS	1	$1,000	$1,000
6	Erosion Control	LS	1	$5,000	$5,000
7	Excavation Cut/Fill Using On-Site Materials	CY	150	$5	$750
8	Excavation with Fill Using Off-Site Materials (Import)	CY	500	$40	$20,000
9	Type M Soil Riprap	CY	1,089	$55	$59,895
10	Un-Grouted Boulders (36-Inch)	LF	120	$100	$12,000
11	Topsoil Removal, Stockpiling, and Replacement	AC	0.75	$10,000	$7,500
12	Soil Preparation and Fine Grading	AC	0.75	$2,500	$1,875
13	Boulder County Seed Mix	AC	0.75	$4,000	$3,000
14	Hydromulch with Tackifier	AC	0.43	$5,000	$2,125
15	Erosion Control Blanket (Koirmat 700)	SY	1,573	$10	$15,726
16	Planting Allowance	LS	1	$5,000	$5,000
				Subtotal	$128,145
				25% Contingency	$32,036
				Total Cost	**$160,182**

Green Ditch Rehabilitation and Fish Passageway
Bid Option B – Installation of fish passage and headworks
Prices in 2011 USD

Bid Item	Description	Unit	Quantity	Unit Price	Total Amount	2014 Adjusted Price
1B	Mobilization/Demobilization	LS	1	$20,000	$20,000	$20,367
2.1B	Tree No. 1 Removal	EA	1	$1,750	$1,750	$1,782
2.2B	Tree No. 2 Removal	EA	1	$1,750	$1,750	$1,782
2.3B	Tree No. 3 Removal	EA	1	$1,750	$1,750	$1,782
2.4B	Tree No. 4 Removal	EA	1	$1,750	$1,750	$1,782
2.5B	Tree No. 5 Removal	EA	1	$1,500	$1,500	$1,528
2.6B	Tree No. 6 Removal	EA	1	$2,500	$2,500	$2,546
3B	Clearing and grubbing	LS	1	$1,500	$1,500	$1,528
4B	Anthropogenic debris removal and disposal	CY	32	$150	$4,800	$4,888
5B	Surplus and organic debris removal and disposal	CY	8	$40	$320	$326
6B	Handling water	LS	1	$6,000	$6,000	$6,110
7B	Class 5 road base	TN	65	$20	$1,300	$1,324
8B	Diversion sill raise	LS	1	$7,500	$7,500	$7,638
9B	Roughened channel rock ramp	LS	1	$75,000	$75,000	$76,377
10B	Type M riprap	SY	34	$175	$5,950	$6,059
11B	Grading	LS	1	$10,000	$10,000	$10,184
12B	Topsoil	CY	28	$40	$1,120	$1,141
13B	Restoration	LS	1	$2,500	$2,500	$2,546
14B	Demolish Existing Headworks	LS	1	$7,000	$7,000	$7,129
15B	New Headworks Structure	LS	1	$50,000	$50,000	$50,918
16.1B	30" x 42" Rectangular Sluice Gate	EA	1	$4,500	$4,500	$4,583
16.2B	48" x 36" Rectanguar Headgate	EA	2	$5,000	$10,000	$10,184
	Sub-total				$218,49	$222,502
	Contingency (25%)					$55,625
	Total					$278,127

ENR Denver Construction Cost Indices

November 2011	6883.8
January 2014	7010.1
Increase	1.84%

Note: Original estimate prepared by AMEC Earth & Environmental in November 2011

Green Ditch Irrigation Company
Repair Boulder Creek Banks (West Area)
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$2,000	$2,000
2	Construction Surveying	LS	1	$1,000	$1,000
3	Water Control and Dewatering	LS	1	$2,000	$2,000
4	Traffic Control	LS	1	$500	$500
5	Clearing and Grubbing	LS	1	$500	$500
6	Erosion Control	LS	1	$1,000	$1,000
7	Excavation with Fill Using Off-Site Materials (Import)	CY	120	$40	$4,800
8	Type M Soil Riprap	CY	245	$55	$13,475
9	Un-Grouted Boulder Cutoff Wall (36-Inch)	LF	40	$100	$4,000
10	Topsoil Removal, Stockpiling, and Replacement	AC	0.25	$10,000	$2,500
11	Soil Preparation and Fine Grading	AC	0.25	$2,500	$625
12	Boulder County Seed Mix	AC	0.25	$4,000	$1,000
13	Hydromulch with Tackifier	AC	0.21	$5,000	$1,035
14	Erosion Control Blanket (Koirmat 700)	SY	209	$10	$2,086
15	Planting Allowance	LS	1	$5,000	$5,000
				Subtotal	$34,435
				25% Contingency	$8,609
				Total Cost	**$43,043**

REPORTING AND FINAL DELIVERABLE

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the statement of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

PAYMENT

Payment will be made based on actual expenditures and invoicing by the applicant. Invoices from any other entity (i.e. subcontractors) cannot be processed by the State. The request for payment must include a description of the work accomplished by major task, and estimate of the percent completion for individual tasks and the entire water activity in relation to the percentage of budget spent, identification of any major issues and proposed or implemented corrective actions. The last 5 percent of the entire water activity budget will be withheld until final project/water activity documentation is completed. All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and help promote the development of a common technical platform.

The above statements are true to the best of my knowledge:

Signature of Applicant: Anne M. Smith

Print Applicant's Name: Anne M. Smith, President Green Ditch Company

Project Title:

Return an electronic version (hardcopy may also be submitted) of this application to:

Craig Godbout – WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
craig.godbout@state.co.us

OLSSON ASSOCIATES

MEMO

TO: Anne Smith (Green Ditch Company) and Todd Doherty (City of Boulder)
CC: File
FROM: Deb Ohlinger and Amy Gabor
RE: Green Ditch Diversion Repairs at Boulder Creek
Olsson Project No. 013-3088
DATE: December 20, 2013

During the September 2013 rain and high flow events, Boulder Creek approximately 1,300 feet east of 61st Street began to flow to the northeast, rather than continuing to flow east to the Green Ditch diversion. The Green Ditch Company can no longer divert water in accordance with their water right. Flow to their diversion needs to be re-established in the channel before the start of the 2014 irrigation season. Three alternatives were evaluated.

Alternative 1
Alternative 1, as shown in the attached Alternative 1 figure, consists of repairing the channel to its pre-flood condition. This alternative would entail repairing the north channel bank to divert flows back into the original channel, repairing the south bank where the lake breached, and relocating sediment that accumulated in the pre-flood channel downstream of the north breach. This alternative is recommended for construction.

The north bank would be repaired by grading at a 4 feet horizontal to 1 foot vertical (4:1) slope up to a 20-foot wide top, and then graded back down to the existing ground at a 4:1 slope. Pre-flood, the topography generally sloped down at a 10:1, or flatter slope. In addition, the vegetation was well established. The entire new bank would be protected with soil riprap, an un-grouted boulder cutoff wall would be installed, and a series of deflector spurs would be installed to ensure the bank would function in a similar way to the pre-flood conditions as vegetation re-establishes. The south bank at the lake breach would be repaired in a similar way. The sediment accumulation east of the north breach would be removed and placed in the scoured area immediately to the west of this area. In addition, the sediment accumulated in Green Ditch from the diversion structure to the headgate would be removed and placed in the channel near the north breach.

The total cost of the north bank repair, south bank repair, and sediment relocation were estimated to be approximately $322,000, $160,000, and $8,000, respectively, for a total cost of $490,000. The cost estimates are attached.

Alternative 2
Alternative 2, as shown in the Alternative 2 figure, consists of constructing a diversion structure and piping the water to the diversion. In addition to the diversion structure and pipe, this alterative would require repairing the south bank at the lake breach, bank stabilization, a weir wall, and modifications to the existing diversion structure. A 32-inch by 49-inch horizontal elliptical pipe at a 0.18 percent (%) slope would be required to convey the full 34.68 cfs water right. The pipe calculation is attached.

4690 Table Mountain Drive, Suite 200
Golden, CO 80403
TEL 303.237.2072
FAX 303.237.2659
www.olssonassociates.com

This alternative was determined to be not feasible for several reasons. The pipe was conceptually located at or near the highest ground elevations; however, the top of the pipe for approximately half of the total length would be located near or at the existing ground elevation, as shown in the Alternative 2 figure, attached. In addition, to tie into the existing diversion structure elevation, the upstream pipe invert would be located approximately 6 feet above the channel flowline. To ensure the ditch company could receive their water right, an approximate 9.5-foot tall weir wall would need to be constructed to dam up the water. That high of a wall would have significant environmental impacts.

This alternative was estimated to cost approximately $460,000, plus $160,000 to repair the south bank at the lake breach, for a total of $620,000. The cost estimates are attached. Due to elevation constraints described herein, this alternative was deemed not feasible.

Alternative 3

Alternative 3 consists of constructing a structure to divert only the required water right, 34.68 cubic feet per second (cfs) to the diversion structure while allowing the remainder of the flows to continue through the breach to the north. Ideally, this structure would be a cross-vane diversion structure, or similar structure. However, to convey the total 34.68 cfs water right, the headwater on the existing structure would need to be 3 feet high, or elevation 5158.7. The existing diversion channel calculation is attached. Since the top of the bank in Alternative 1 would be at elevation 5159, the height of the diversion crest would essentially match that alternative. Because of the significant height, the best way to achieve this type of structure is to replace the banks, as detailed in Alternative 1; therefore, no separate analysis was done for this alternative.

Cost Summary

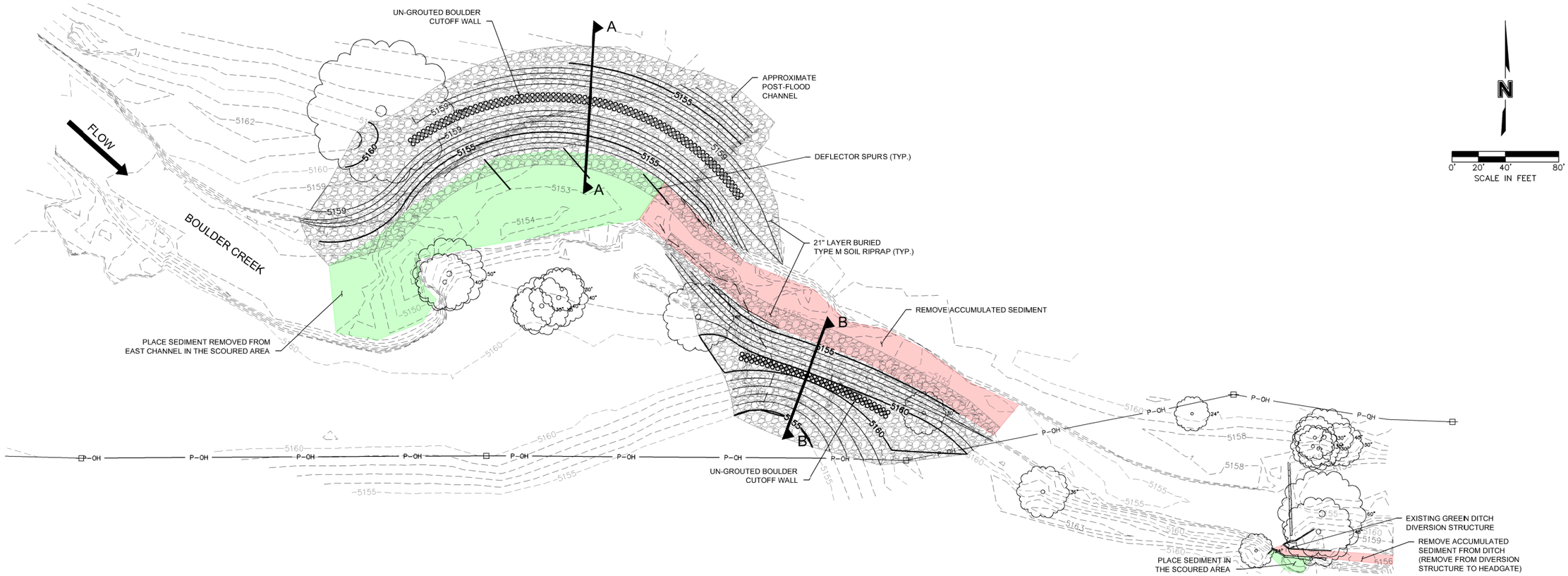
A summary of costs for each alternative is shown in Table 1.

Table 1 - Cost Summary

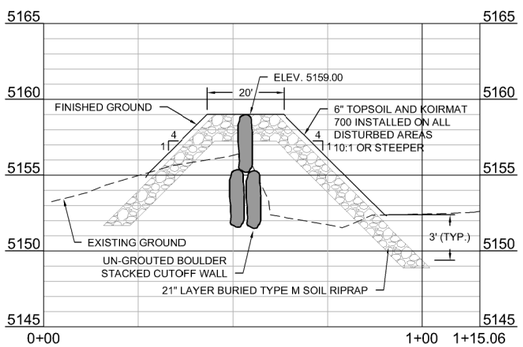
Description	Alternative 1	Alternative 2
Repair Boulder Creek banks	$321,576	
Relocate channel sediment	$8,125	
Repair bank at lake breach	$160,182	$160,182
Pipe diversion		$460,385
Total Alternative Cost	$489,883	$620,567

Appendix

Figures
Opinions of Probable Costs
Pipe Calculations
Existing Diversion Channel Calculations

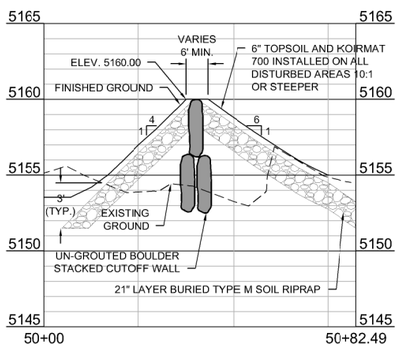


SECTION A-A
BOULDER CREEK BANK REPAIR



HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'

SECTION B-B
LAKE BANK REPAIR



PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
December 23, 2013
DATE PRINTED
OLSSON ASSOCIATES

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.

GENERAL NOTES:

1. ALL DISTURBED AREAS OUTSIDE OF THE MAIN CHANNEL ARE TO BE RESEEDED.
2. ALL SIDEWALK, PAVEMENT, CURB, AND GUTTER DAMAGED DURING CONSTRUCTION SHALL BE REPLACED WITH ALL NEW MATERIALS AT THE CONTRACTOR'S EXPENSE.
3. THE CONTRACTOR IS TO STAKE LIMITS OF CONSTRUCTION PRIOR TO BEGINNING ANY WORK THAT WILL DISTURB EXISTING VEGETATION. LIMITS OF CONSTRUCTION SHALL BE CONFIRMED BY OWNER IN THE FIELD.
4. THE TOP 6" OF TOPSOIL SHALL BE STRIPPED, STOCKPILED, AND RESPREAD ACROSS AREAS TO BE SEEDED.

REV NO.	DATE	REVISIONS DESCRIPTION

REVISIONS

OLSSON ASSOCIATES
4690 Table Mountain Drive
Suite 200
Golden, CO 80403
TEL 303.237.2072
FAX 303.237.2659

designed by: AG
drawn by: AG
checked by: DO/DK
project no.: 013-3088
date: 12/2013

GREEN DITCH COMPANY

GREEN DITCH REPAIR

ALTERNATIVE 1
CONCEPTUAL REPAIR PLAN
RESTORE PRE-FLOOD CONDITIONS

CONCEPT
SHEET 1 of 1

DWG: F:\Projects\013-3088_WTRS\Conceptual_Plans\013088_ALTS.dwg
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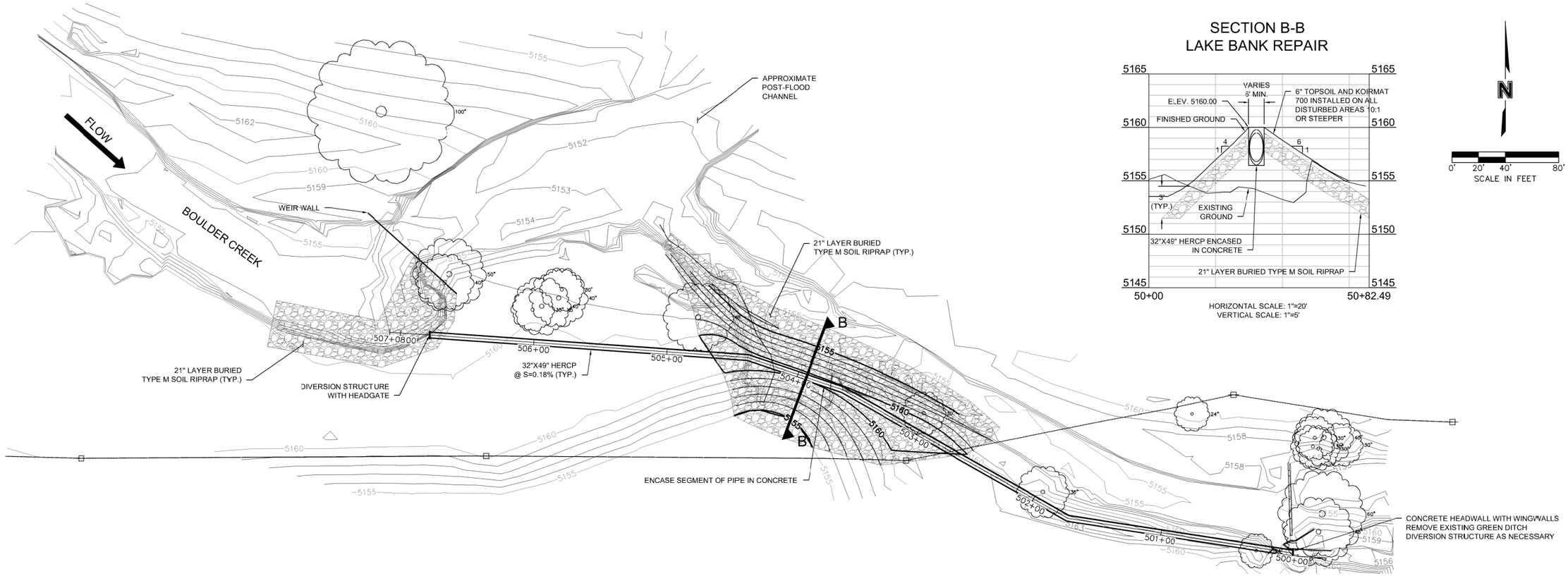
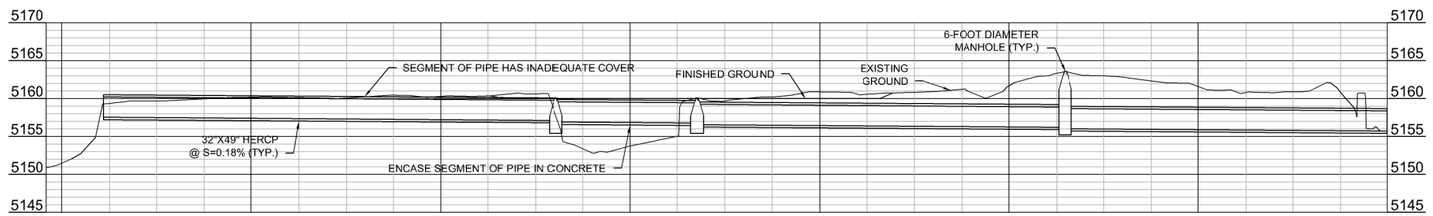


SECTION B-B
LAKE BANK REPAIR

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'

PIPE PROFILE



HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1"=10'

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
December 20, 2013
DATE PRINTED
OLSSON ASSOCIATES

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

GENERAL NOTES:

1. ALL DISTURBED AREAS OUTSIDE OF THE MAIN CHANNEL ARE TO BE RESEEDED.
2. ALL SIDEWALK, PAVEMENT, CURB, AND GUTTER DAMAGED DURING CONSTRUCTION SHALL BE REPLACED WITH ALL NEW MATERIALS AT THE CONTRACTOR'S EXPENSE.
3. THE CONTRACTOR IS TO STAKE LIMITS OF CONSTRUCTION PRIOR TO BEGINNING ANY WORK THAT WILL DISTURB EXISTING VEGETATION. LIMITS OF CONSTRUCTION SHALL BE CONFIRMED BY OWNER IN THE FIELD.
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GREEN DITCH COMPANY

GREEN DITCH DIVERSION REPAIRS AT BOULDER CREEK

ALTERNATIVE 2
CONCEPTUAL REPAIR PLAN
NEW DIVERSION AND PIPE

CONCEPT

SHEET 2 of 2

Green Ditch Irrigation Company
Alternative 1 - Repair Boulder Creek Banks
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$13,000	$13,000
2	Construction Surveying	LS	1	$2,000	$2,000
3	Water Control and Dewatering	LS	1	$13,000	$13,000
4	Traffic Control	LS	1	$1,000	$1,000
5	Clearing and Grubbing	LS	1	$2,000	$2,000
6	Erosion Control	LS	1	$10,000	$10,000
7	Excavation Cut/Fill Using On-Site Materials	CY	400	$5	$2,000
8	Excavation with Fill Using Off-Site Materials (Import)	CY	1,200	$40	$48,000
9	Type M Soil Riprap	CY	2,038	$55	$112,090
10	Un-Grouted Boulder Cutoff Wall (36-Inch)	LF	280	$100	$28,000
11	Spurs	EA	3	$500	$1,500
12	Topsoil Removal, Stockpiling, and Replacement	AC	1.25	$10,000	$12,500
13	Soil Preparation and Fine Grading	AC	1.25	$2,500	$3,125
14	Boulder County Seed Mix	AC	1.25	$4,000	$5,000
15	Hydromulch with Tackifier	AC	0.81	$5,000	$4,046
16	Erosion Control Blanket (Koirmat 700)	SY	2,133	$10	$21,333
17	Planting Allowance	LS	1	$10,000	$10,000
				Subtotal	$257,261
				25% Contingency	$64,315
				Total Cost	**$321,576**

Green Ditch Irrigation Company
Alternative 1 - Relocate Channel and Ditch Sediment
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$1,000	$1,000
2	Construction Surveying	LS	1	$1,000	$1,000
3	Water Control and Dewatering	LS	1	$500	$500
4	Traffic Control	LS	1	$500	$500
5	Clearing and Grubbing	LS	1	$500	$500
6	Erosion Control	LS	1	$500	$500
7	Excavation Cut/Fill Using On-Site Materials	CY	500	$5	$2,500
				Subtotal	$6,500
				25% Contingency	$1,625
				Total Cost	**$8,125**

Green Ditch Irrigation Company
Alternatives 1 and 2 - Repair Lake Breach
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$6,000	$6,000
2	Construction Surveying	LS	1	$2,000	$2,000
3	Water Control and Dewatering	LS	1	$6,000	$6,000
4	Traffic Control	LS	1	$1,000	$1,000
5	Clearing and Grubbing	LS	1	$1,000	$1,000
6	Erosion Control	LS	1	$5,000	$5,000
7	Excavation Cut/Fill Using On-Site Materials	CY	150	$5	$750
8	Excavation with Fill Using Off-Site Materials (Import)	CY	500	$40	$20,000
9	Type M Soil Riprap	CY	1,089	$55	$59,895
10	Un-Grouted Boulders (36-Inch)	LF	120	$100	$12,000
11	Topsoil Removal, Stockpiling, and Replacement	AC	0.75	$10,000	$7,500
12	Soil Preparation and Fine Grading	AC	0.75	$2,500	$1,875
13	Boulder County Seed Mix	AC	0.75	$4,000	$3,000
14	Hydromulch with Tackifier	AC	0.43	$5,000	$2,125
15	Erosion Control Blanket (Koirmat 700)	SY	1,573	$10	$15,726
16	Planting Allowance	LS	1	$5,000	$5,000
				Subtotal	$128,145
				25% Contingency	$32,036
				Total Cost	**$160,182**

Green Ditch Irrigation Company
Alternative 2 - New Diversion with Pipe
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$20,000	$20,000
2	Construction Surveying	LS	1	$5,000	$5,000
3	Water Control and Dewatering	LS	1	$20,000	$20,000
4	Traffic Control	LS	1	$2,000	$2,000
5	Clearing and Grubbing	LS	1	$5,000	$5,000
6	Erosion Control	LS	1	$5,000	$5,000
7	49-Inch by 32-Inch HERCP	LF	678	$200	$135,600
8	6-Foot Diameter Manhole	EA	3	$6,000	$18,000
9	Diversion Structure with Headgate	EA	1	$45,000	$45,000
10	Modify Existing Diversion Structure	EA	1	$10,000	$10,000
11	Weir Wall	EA	1	$90,000	$90,000
11	Type M Soil Riprap	CY	384	$55	$21,120
12	Soil Preparation and Fine Grading	AC	0.60	$2,500	$1,507
13	Boulder County Seed Mix	AC	0.60	$4,000	$2,412
14	Hydromulch with Tackifier	AC	0.60	$5,000	$3,015
15	Planting Allowance	LS	1	$10,000	$10,000
				Subtotal	$383,654
				25% Contingency	$76,731
				Total Cost	**$460,385**

Worksheet for Elliptical Pipe

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00180	ft/ft
Normal Depth	2.67	ft
Rise	2.67	ft
Span	4.08	ft

Results

Discharge	35.70	ft³/s
Flow Area	8.55	ft²
Wetted Perimeter	10.71	ft
Hydraulic Radius	0.80	ft
Top Width	0.00	ft
Critical Depth	1.61	ft
Percent Full	100.0	%
Critical Slope	0.00372	ft/ft
Velocity	4.17	ft/s
Velocity Head	0.27	ft
Specific Energy	2.94	ft
Froude Number	0.00	
Maximum Discharge	38.82	ft³/s
Discharge Full	35.67	ft³/s
Slope Full	0.00180	ft/ft
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

Worksheet for Elliptical Pipe

GVF Output Data

Downstream Velocity	52495097472319000.00	ft/s
Upstream Velocity	52495097472319000.00	ft/s
Normal Depth	2.67	ft
Critical Depth	1.61	ft
Channel Slope	0.00180	ft/ft
Critical Slope	0.00372	ft/ft

Worksheet for Existing Diversion Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00150	ft/ft
Bottom Width	5.00	ft
Discharge	34.68	ft^3/s

Results

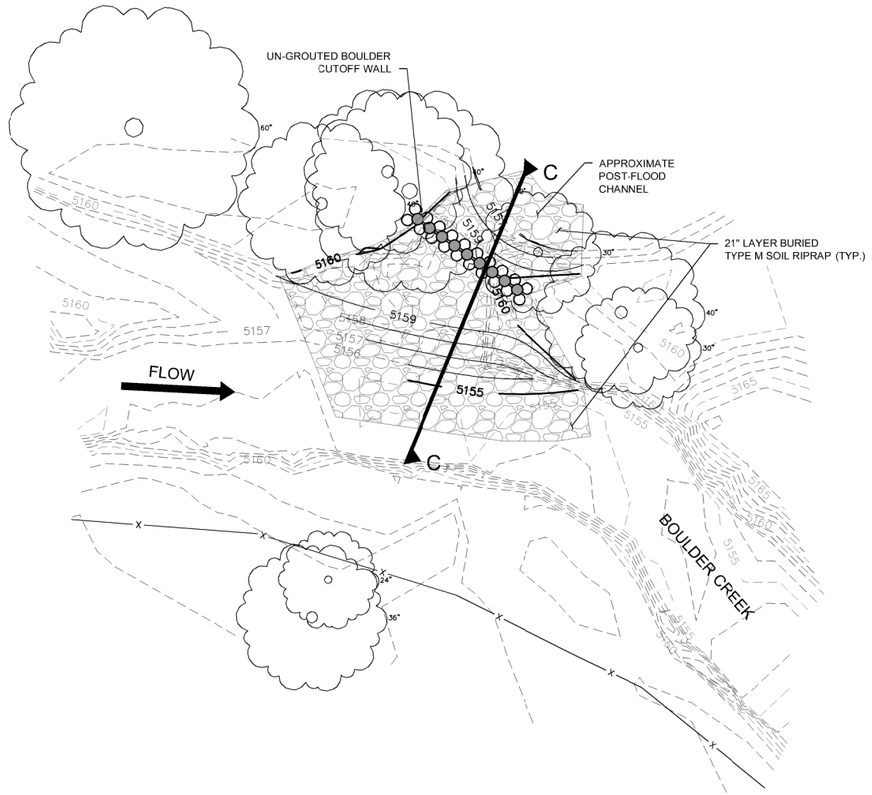
Normal Depth	2.95	ft
Flow Area	14.77	ft^2
Wetted Perimeter	10.91	ft
Hydraulic Radius	1.35	ft
Top Width	5.00	ft
Critical Depth	1.14	ft
Critical Slope	0.02072	ft/ft
Velocity	2.35	ft/s
Velocity Head	0.09	ft
Specific Energy	3.04	ft
Froude Number	0.24	
Flow Type	Subcritical	

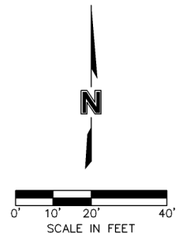
GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

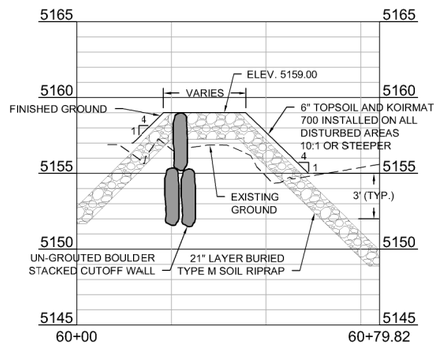
GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.95	ft
Critical Depth	1.14	ft
Channel Slope	0.00150	ft/ft
Critical Slope	0.02072	ft/ft





SECTION C-C
BOULDER CREEK BANK REPAIR



HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION
December 23, 2013
DATE PRINTED
OLSSON ASSOCIATES

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.

GENERAL NOTES:

1. ALL DISTURBED AREAS OUTSIDE OF THE MAIN CHANNEL ARE TO BE RESEEDED.
2. ALL SIDEWALK, PAVEMENT, CURB, AND GUTTER DAMAGED DURING CONSTRUCTION SHALL BE REPLACED WITH ALL NEW MATERIALS AT THE CONTRACTOR'S EXPENSE.
3. THE CONTRACTOR IS TO STAKE LIMITS OF CONSTRUCTION PRIOR TO BEGINNING ANY WORK THAT WILL DISTURB EXISTING VEGETATION. LIMITS OF CONSTRUCTION SHALL BE CONFIRMED BY OWNER IN THE FIELD.
4. THE TOP 6" OF TOPSOIL SHALL BE STRIPPED, STOCKPILED, AND RESPREAD ACROSS AREAS TO BE SEEDED.

REV NO.	DATE	REVISIONS DESCRIPTION

REVISIONS

OLSSON ASSOCIATES
4690 Table Mountain Drive
Suite 200
Golden, CO 80403
TEL 303.237.2072
FAX 303.237.2659

designed by: AG
drawn by: AG
checked by: DO/DK
project no.: 013-3088
date: 12/2013

GREEN DITCH COMPANY

GREEN DITCH REPAIR

CONCEPTUAL REPAIR PLAN
WEST AREA

CONCEPT
SHEET 1 of 1

DWG: F:\Projects\013-3088_WTRS\Conceptual_Plans\013088_ALTS.dwg
DATE: Dec 23, 2013 3:23pm
XREFS: 13088_XTOPO 13088_XBASE
USER: qgabor
13088_22x34TB 13088_PUTIL 13088_PTOPO

Green Ditch Irrigation Company
Repair Boulder Creek Banks (West Area)
Engineer's Opinion of Probable Construction Costs
Olsson Project No. 013-3088

Item No.	Item Description	Unit	Quantity	Unit Cost	Item Cost
1	Mobilization	LS	1	$2,000	$2,000
2	Construction Surveying	LS	1	$1,000	$1,000
3	Water Control and Dewatering	LS	1	$2,000	$2,000
4	Traffic Control	LS	1	$500	$500
5	Clearing and Grubbing	LS	1	$500	$500
6	Erosion Control	LS	1	$1,000	$1,000
7	Excavation with Fill Using Off-Site Materials (Import)	CY	120	$40	$4,800
8	Type M Soil Riprap	CY	245	$55	$13,475
9	Un-Grouted Boulder Cutoff Wall (36-Inch)	LF	40	$100	$4,000
10	Topsoil Removal, Stockpiling, and Replacement	AC	0.25	$10,000	$2,500
11	Soil Preparation and Fine Grading	AC	0.25	$2,500	$625
12	Boulder County Seed Mix	AC	0.25	$4,000	$1,000
13	Hydromulch with Tackifier	AC	0.21	$5,000	$1,035
14	Erosion Control Blanket (Koirmat 700)	SY	209	$10	$2,086
15	Planting Allowance	LS	1	$5,000	$5,000
				Subtotal	$34,435
				25% Contingency	$8,609
				Total Cost	**$43,043**

Green Ditch Diversion Rehabilitation and Fishway Technical Specifications

November, 2011

I hereby certify that this Project was prepared by me or under my direct supervision and that I am a duly Registered Engineer under the laws of the State of Colorado.

[Signed] _____

Date 12/08/2011 Re. No. 16626

COLORADO REGISTERED DOUGLAS R. LAIHO 16626 PROFESSIONAL ENGINEER

[Signed] _____

Date 12-9-11 Re. No. 12986

JON X. GILTNER REGISTERED 12986 PROFESSIONAL ENGINEER STATE OF COLORADO

Section 01010 – Summary of Work

Part 1 - General

1.1 Project Description

A. The project consists generally of the reconstruction of the Green Ditch Diversion headworks and the instream diversion structure while incorporating fishway passage provisions.

B. The primary goal at this site is to construct a roughened channel rock ramp fishway, a diversion structure that can operate without flashboards and a headworks that has operable water control for the sand sluice and headgate. One of the primary purposes of having operable water control is to direct low flow water to the fishway when appropriate. Unfortunately, the headworks is in poor structural condition, in need of replacement and is overgrown with large tree clumps. Tree removal could cause significant undesired collateral damage to the existing headworks and the existing headworks condition does not warrant more than a modest investment in rehabilitation. Therefore, two construction options have been configured that are expected to vary significantly in cost. Only one of the two options will be selected for construction. In addition, the individual bid items have been defined in a manner that will allow separation of costs to the appropriate responsible entity. Bid Option A covers modification of the existing structures and construction of a fishway. Bid Option B covers replacement of the headworks, modification of the diversion sill and construction of a fishway, as described in more detail below.

C. Major items of construction of Bid Option A include:

- Minimize constructed changes to the existing headworks and minimize indirect, unintended damage to the existing headworks that would almost certainly occur as a result of removing the largest of several immediate large tree clumps. The existing headworks would be modified only by constructing improved stop log type manual closures for the sand sluice and ditch entrance.
- Raise the concrete diversion sill using reinforced concrete to eliminate the need for flashboards and to create a fishway notch
- Create an approximately 67 foot long and 7.5% slope instream roughened channel rock ramp fishway using grouted boulders and riprap immediately downstream of and in the approximate center the diversion sill
- Miscellaneous other ancillary work covering tree removals, handling water, riprap, stream bed grading and removal of surplus/unsuitable material from the site.

D. Major items of construction of Bid Option B include:

- Remove and replace the entire existing headworks with a new structure and remove all obstructing tree clumps. The new headworks would have a new double gated head gate structure with a concrete walkway over the ditch, a new gated sand sluice structure and a new concrete lined ditch where the former concrete lined ditch existed.

- Raise the concrete diversion sill using reinforced concrete to eliminate the need for flashboards and to create a fishway notch. The new sand sluice structure would tie into the raised diversion sill at the same location as the current stop log controlled sand sluice.

- Create the same fishway as described under Bid Option A.

- Miscellaneous other ancillary work covering handling water, riprap, stream bed grading and removal of surplus/unsuitable material from the site.

E. The City of Boulder (City) will be acting as the Project Owner on behalf of both the City and the Green Ditch Company (Ditch Company). Payment for work completed will be made by the City as described in Section 01025.

1.2 General

A. A single construction contract for one of the two bid options covers the Project.

B. Sequence of operations or place of work commencement may be determined by Owner as deemed to best serve needs and convenience of Owner, or as necessity of occasion.

1.3 Coordination

A. Immediately before the commencement of Work at the site, a construction conference will be held on-site at a mutually agreed time and place. Conference attendance is expected to include:

- Contractor and his superintendent
- Principal Subcontractors
- Representatives of principal suppliers and manufacturers as appropriate
- Engineer
- Representatives of the Owner
- Others as requested by Contractor, Owner, or Engineer.

B. The purpose of the conference is to designate responsible personnel and establish a working relationship between all involved parties. Matters requiring coordination

will be discussed and procedures for handling such matters will be established. The agenda will include:

- Contractor's tentative schedule
- Critical Work sequencing
- Field decisions and Change Orders
- Equipment deliveries, priorities, and handling of installation timing
- Contractor's assignments for safety and first aid
- Permitting issues
- Use and access to construction area.

C. Engineer will preside at the conference and will arrange for keeping minutes and distributing the minutes to all persons in attendance.

1.4 Field Measurements and Inspection of Surfaces

A. Verify grades, lines, levels, locations, and dimensions as shown on Drawings, and inspect surfaces that are to receive Work before proceeding with fabricating, assembling, fitting, or erecting. Contractor shall be solely responsible for accuracy of measurements and laying out of its work. Notify Engineer in writing in case of unsuitable conditions, defective substrates, or discrepancies in Contract Documents. Starting of work shall imply acceptance of conditions.

B. Where applicable, measure of Work for payment purposes will be determined by the Engineer at project site.

1.5 Regulatory Requirements

A. The Owner has received an opinion from the Corps of Engineers that a Section 404 permit will not be required as the Work is covered under an agricultural exemption. Written confirmation of this exception from a permit will be provided to the Contractor if needed.

B. A wetland permit or clearance to complete the work without such permit from the City of Boulder will be obtained by the Owner.

C. Regulatory compliance includes, but is not limited to, filing information on hazardous materials (if any) to be used at the project site with the State Emergency Response Board, the Local Emergency Planning Committee (county agency), and the local fire department in accordance with the Superfund Amendment and Reauthorization Act (SARA) Title III. If reportable amounts of hazardous materials will be used at the project site, Contractor shall file material safety data sheets and tier two reports, along with the project's Drawings and Specifications needed by the Contractor.

B. If, after placing concrete, waterstops are substantially out of position or shape, the surrounding concrete shall be removed, the waterstop reset, and the concrete replaced at the Contractor's expense.

END OF SECTION

Bid Schedule

Bid Option A

Green Ditch Diversion Rehabilitation and Fish Passageway

Bid Schedule - Bid Option A

Bid Item	Description	Unit	Quantity	Unit Price	Unit Price Written	Total Amount
1A	Mobilization/Demobilization	LS	1			
2.1A	Tree No. 1 Removal	EA	1			
2.2A	Tree No. 2 Removal	EA	1			
2.3A	Tree No. 3 Removal	EA	1			
2.4A	Tree No. 4 Removal	EA	1			
2.5A	Tree No. 5 Removal	EA	1			
3A	Clearing and Grubbing	LS	1			
4A	Anthropogenic Debris Removal and Disposal	CY	3			
5A	Surplus and Organic Debris Removal and Disposal	CY	5			
6A	Handling Water	LS	1			
7A	Class 5 Road Base	TN	65			
8A	Diversion Sill Raise	LS	1			
9A	Roughened Channel Rock Ramp	LS	1			
10A	Type M Riprap	SY	6			
11A	Grading	LS	1			
12A	Topsoil	CY	20			
13A	Restoration	LS	1			
14.1A	Stop Log Mounting and Stop Logs - Headgate	LS	1			
14.2A	Stop Log Mounting and Stop Logs - Sand Sluice	LS	1			
				TOTAL		

Bid Schedule

Bid Option B

Green Ditch Diversion Rehabilitation and Fishway

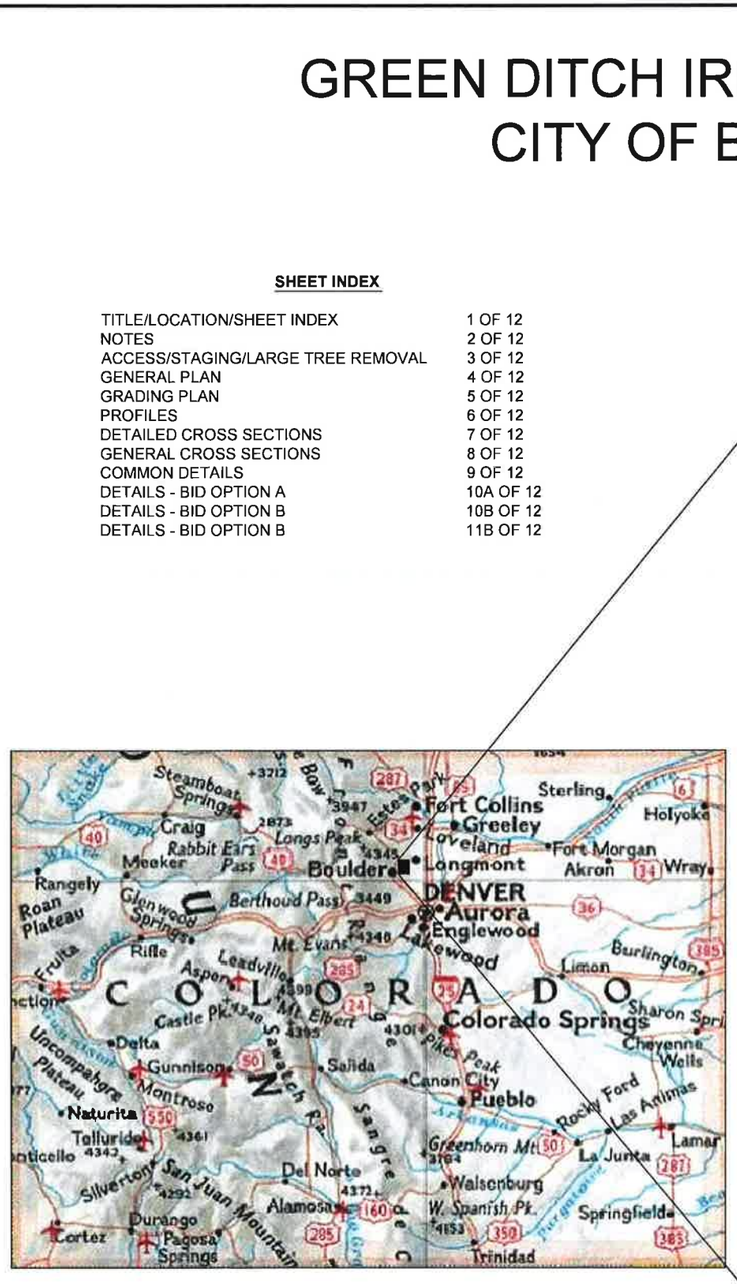
Bid Schedule - Bid Option B

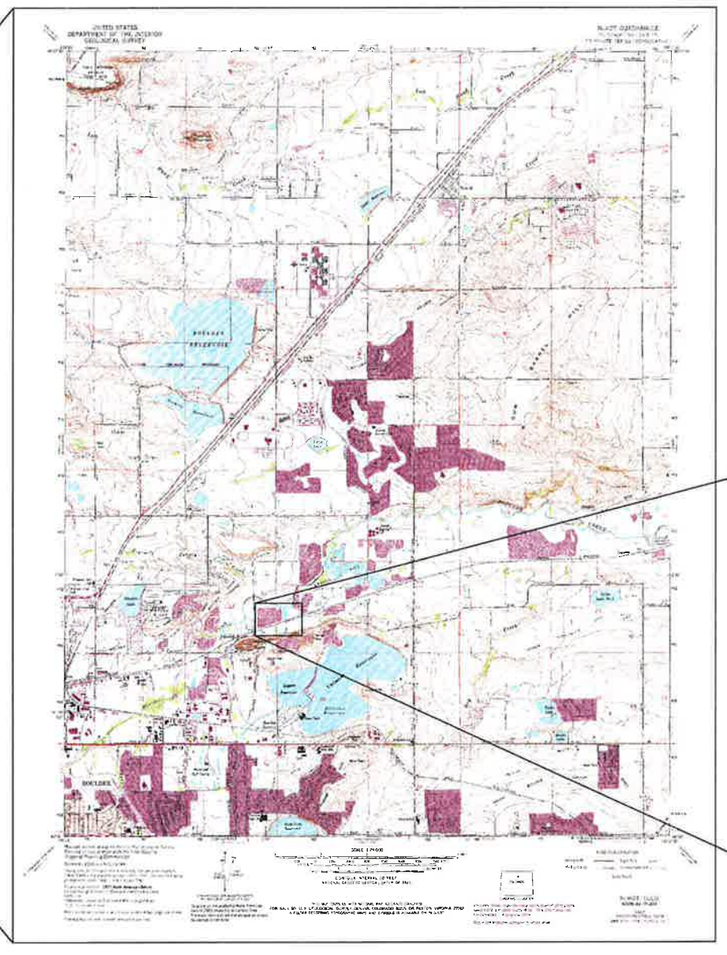
Bid Item	Description	Unit	Quantity	Unit Price	Unit Price Written	Total Amount
1B	Mobilization/Demobilization	LS	1			
2.1B	Tree No. 1 Removal	EA	1			
2.2B	Tree No. 2 Removal	EA	1			
2.3B	Tree No. 3 Removal	EA	1			
2.4B	Tree No. 4 Removal	EA	1			
2.5B	Tree No. 5 Removal	EA	1			
2.6B	Tree No. 6 Removal	EA	1			
3B	Clearing and Grubbing	LS	1			
4B	Anthropogenic Debris Removal and Disposal	CY	32			
5B	Surplus and Organic Debris Removal and Disposal	CY	8			
6B	Handling Water	LS	1			
7B	Class 5 Road Base	TN	65			
8B	Diversion Sill Raise	LS	1			
9B	Roughened Channel Rock Ramp	LS	1			
10B	Type M Riprap	SY	34			
11B	Grading	LS	1			
12B	Topsoil	CY	28			
13A	Restoration	LS	1			
14B	Demolish Existing Headworks	LS	1			
15B	New Headworks Structure	LS	1			
16.1B	30"x42" Rectangular Sluice Gate	EA	1			
16.2B	48"x36" Rectangular Headgate	EA	2			
				TOTAL		

GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY
CITY OF BOULDER - OPEN SPACE & MOUNTAIN PARKS

APPROVED ON THE _____DAY OF_____2011

SHEET INDEX

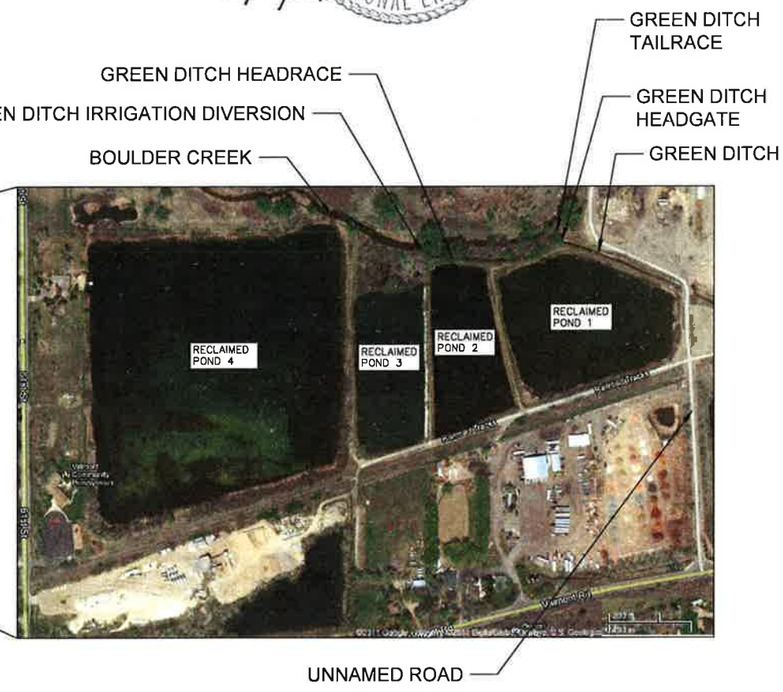




ROBERT CRIFASI, CITY OF BOULDER - OPEN SPACE & MOUNTAIN PARKS

PROJECT DESIGN ENGINEER
DOUGLAS R. LAIHO, CO. P.E. NO. 16626
GEI CONSULTANTS, INC.
12/08/2011

COLORADO REGISTERED
DOUGLAS R. LAIHO
16626
PROFESSIONAL ENGINEER



NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY TECHNICAL SPECIFICATIONS DATED NOVEMBER 2011.

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
6						
5						
4						
3						
2						
1						
0						

City of Boulder

City of Boulder - Open Space & Mountain Parks
7315 Red Deer Drive
Boulder, Colorado, 80301

amec Earth & Environmental
Colorado Center Tower Two
2000 S. Colorado Blvd., Suite 2-1000
Denver, CO 80222

GEI Consultants
4601 DTC Blvd.
Denver, CO 80237
303 662 0100
www.geiconsultants.com

DATUM:	N/A
PROJECTION:	N/A
DRAWN BY:	KAP (GEI)
REVIEWED BY:	DRL (GEI)
ORIGINAL SCALE:	AS SHOWN

PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: TITLE, LOCATION, AND SHEET INDEX
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO.:	8276556000.003
REVISION NO.:	
DATE:	November 2011
DRAWING NO.:	
SHEET NO.:	1 of 12

GENERAL NOTES:

1. THESE NOTES SHALL BE USED IN CONJUNCTION WITH THE DRAWINGS AND TECHNICAL SPECIFICATIONS AND ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
2. DIMENSIONS AND NOTATIONS SUPERSEDE SCALE OF THE DRAWINGS.
3. THE DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURES. ALL BRACING, TEMPORARY SUPPORTS, SHORING, ETC. ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
4. OBSERVATION VISITS TO THE JOB SITE BY THE ENGINEER DO NOT INCLUDE INSPECTION OF CONSTRUCTION OR PROCEDURES. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS AND FOR SAFETY CONDITIONS AT THE WORK SITE. THESE VISITS SHALL NOT BE CONSTRUED AS CONTINUOUS AND DETAILED INSPECTIONS.
5. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS, SPECIFICALLY INCLUDING GRADING AND WATER HANDLING, IN SUCH A MANNER THAT AT NO TIME DOES LESS THAN THE CHANNEL'S PRECONSTRUCTION FLOW HANDLING CAPACITY EXIST AND FLOW DOES NOT BECOME SPATIALLY VARIED.
6. ALL CONDITIONS NOTED AS EXISTING ARE BASED ON THE BEST INFORMATION CURRENTLY AVAILABLE AT THE TIME OF PREPARATION OF THESE DRAWINGS. THE CONTRACTOR IS TO VERIFY ALL CONDITIONS BEFORE STARTING WORK. SHOULD CONDITIONS ARISE WHICH ARE DIFFERENT FROM THOSE SHOWN ON THE DRAWINGS, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY FOR RESOLUTION OF THE SITUATION.
7. CONSTRUCTION OPERATIONS SHALL BE CONDUCTED IN ALL MANNER NECESSARY TO MINIMIZE DISTURBANCE OF THE EXISTING ECOLOGY. HEAVY EQUIPMENT MAY MOVE ALONG THE STREAMBED, HOWEVER, THE TRIPS SHALL BE MINIMIZED TO THE ABSOLUTE FEWEST POSSIBLE AND OVER THE SHORTEST DISTANCE. DISTURBED ACCESS AND CONSTRUCTION AREAS SHALL BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN PRIOR EXISTING CONDITIONS. NO VEHICLE FLUIDS, CONSTRUCTION DEBRIS OR OTHER DELETERIOUS MATERIALS SHALL BE ACCIDENTALLY OR INTENTIONALLY DISCHARGED WITHIN THE PROJECT AREA. ANY SUCH DISTURBED AREAS SHALL BE RESTORED TO THE CONDITION AS DESCRIBED ABOVE.
8. CONSTRUCTION STAGING SHALL BE PERMITTED WITHIN AREAS DISTURBED FOR FEATURES CONSTRUCTION AND WITHIN THE CONSTRUCTION LIMITS. SUGGESTED STAGING AREAS ARE SHOWN ON SHEET 3.
9. DISTURBANCE WITHIN CONSTRUCTION LIMITS SHALL BE LIMITED TO THAT NECESSARY FOR CONSTRUCTION OF DESIGNATED FEATURES ONLY.
10. THE CONSTRUCTION SITE IS IN A RIPARIAN AREA ALONG BOULDER CREEK. THE CONTRACTOR SHALL CONTROL HIS OPERATIONS TO WITHIN THE MARKED AND DESCRIBED CONSTRUCTION LIMITS AND ACCESS ROUTES. ANY VEGETATION WITHIN THE CONSTRUCTION LIMITS TO BE REMOVED AND DISPOSED OF SHALL BE LIMITED TO THOSE CLEARLY IDENTIFIED BY THE OWNER'S REPRESENTATIVE. ANY OTHER VEGETATION SHALL NOT BE DISTURBED.
11. ALL DISTURBED GROUND SURFACES ADJACENT TO CONSTRUCTION FEATURES SHALL BE REVEGTATED BY BROADCAST SEEDING WITH CRIMPED STRAW MULCH WITH THE SEED MIX SPECIFIED ON SHEET 3.

MISCELLANEOUS NOTES:

1. THE SANDGATE SHALL BE A 30"x42", 5-FOOT HEAD, RECTANGULAR FABRICATED SLIDE GATE AS MANUFACTURED BY FRESNO VALVES & CASTINGS OR APPROVED EQUAL. THE GATE SHALL BE SELF-CONTAINED AND CONSTRUCTED OF GALVANIZED CARBON STEEL. THE FRAME HEIGHT SHALL BE 73-INCHES. THE GATE SHALL BE PROVIDED WITH A HAND WHEEL SET TO OPEN COUNTER CLOCKWISE. IT SHALL HAVE A FLUSH BOTTOM CLOSURE, FLAT BACK, AND U.H.M.W. POLY-LINER. THE STEM AND ANCHOR BOLTS SHALL BE STAINLESS STEEL.
2. THE TWO HEADGATES SHALL BE 48"x36", 5-FOOT HEAD, RECTANGULAR FABRICATED SLIDE GATES AS MANUFACTURED BY FRESNO VALVES & CASTINGS OR APPROVED EQUAL. THE GATES SHALL BE SELF-CONTAINED AND CONSTRUCTED OF GALVANIZED CARBON STEEL. THE FRAME HEIGHT SHALL BE 69-INCHES. THE GATES SHALL BE PROVIDED WITH HAND WHEELS SET TO OPEN COUNTER CLOCKWISE. THEY SHALL HAVE FLUSH BOTTOM CLOSURES, FLAT BACKS, AND U.H.M.W. POLY-LINERS. THE STEMS AND ANCHOR BOLTS SHALL BE STAINLESS STEEL.

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   P.O. BOX 40
   SELMA, CA 93662
   (800) 333-1658
   WWW.FRESNOVALVES.COM

STRUCTURAL NOTES

1. THE FOLLOWING NOTES ARE INTENDED AS EXCEPTIONS TO THE ITEMS IN THE STANDARD SPECIFICATIONS WHICH MAY OTHERWISE BE IN CONFLICT. IN ALL OTHER CASES, THE STANDARD SPECIFICATIONS APPLY.
2. ALL STRUCTURAL CONCRETE SHALL BE CLASS B - CDOT STANDARD SPECIFICATIONS AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CDOT STANDARD SPECIFICATIONS.
3. REINFORCING STEEL SHALL BE GRADE 60.
4. CONCRETE, AND GROUT SHALL NOT BE POURED INTO FLOWING OR STANDING WATER.
5. ALL EXPOSED STRUCTURAL CONCRETE CORNERS SHALL BE CHAMFERED ¾" ± UNLESS NOTED OTHERWISE.
6. REINFORCEMENT SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS AND ALL CONSTRUCTION JOINTS SHALL HAVE CONTINUOUS #4 GREENSTREAK #701 WATERSTOP (RIBBED WITH CENTER BULB) IN PLACE.
7. ALL EXPOSED CONCRETE SHALL RECEIVE A FINISH C OR CLASS 1 - CDOT STANDARD SPECIFICATIONS.
8. THE MINIMUM SPLICE LENGTH SHALL BE 48 BAR DIAMETERS.
9. CONCRETE STRUCTURE FOOTINGS SHALL BE CONSTRUCTED ON UNDISTURBED NATURAL, NON-ORGANIC SOIL OR ON CL OR GC SOIL WHICH HAS BEEN PLACED IN 9 INCH LOOSE THICKNESS LIFTS AND COMPACTED TO A MINIMUM OF 95% PROCTOR DENSITY IN CONFORMANCE WITH ASTM D698-78. STRUCTURAL BACKFILL FOR ALL STRUCTURES SHALL BE CL OR GC SOIL WHICH HAS BEEN PLACED IN 9 INCH LOOSE THICKNESS LIFTS AND COMPACTED TO A MINIMUM OF 95% PROCTOR DENSITY IN CONFORMANCE WITH ASTM D698-78. PRIOR TO START OF CONSTRUCTION, A REGISTERED PROFESSIONS SOILS ENGINEER SELECTED BY THE OWNER SHALL BE CONTACTED TO SCHEDULE A VISIT DURING EXCAVATION TO CONFIRM THAT THE NATURAL SOILS AT FOOTING BEARING AND PROPOSED STRUCTURAL FILL MEET THE ABOVE CRITERIA AND ARE SUITABLE FOR BEARING.
10. ALL CONSTRUCTION JOINTS SHALL BE LEFT ROUGH TO PROVIDE A GOOD BOND AND SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.
11. CONCRETE WASHOUT SHALL NOT OCCUR ON-SITE. THE CONTRACTOR SHALL PROVIDE HIS OWN DISPOSAL SITE FOR EXCESS CONCRETE AND TO WASH OUT THE CONCRETE TRUCK. UPON COMPLETION OF WORK AND PRIOR TO FINAL INSPECTION, THE CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIALS AT A LEGAL OFFSITE DISPOSAL SITE.
12. ALL CONCRETE AND GROUT SHALL HAVE 1.5 POUNDS OF WELL-DISTRIBUTED FIBERMESH PER CUBIC YARD.
13. THE LOW FLOW PORTION OF THE FISHWAY SIDES AND BOTTOM ROUGHNESS SHALL BE FORMED BY RIPRAP TYPE M, GROUTED IN PLACE IN A MANNER THAT MEETS THE FOLLOWING CRITERIA:
    - 13.1. ACHIEVES A LOW FLOW, FLOW PATH (2 INCHES DEPTH AVERAGE) OF DOUBLE THE NOMINAL STRAIGHT LENGTH OF THE FISHWAY WITH WATER GOING AROUND ROUGHNESS ELEMENTS.
    - 13.2. MAXIMIZES CHANNEL AND SIDE ROUGHNESS THAT ACHIEVES NON-AERATED SIDE AND CHANNEL EDDIES 2 TO 4 INCHES LONG WITH WATER JUST GOING OVER ROUGHNESS ELEMENTS.
    - 13.3. ROCKS ARE PLACED WITH A MAXIMUM OF EDGE CONTACT AND WITH ⅔ OF THEIR VERTICAL DIMENSION BELOW THE GROUT LEAVING A VERY ROUGH SURFACE.
    - 13.4. PRODUCES AN AVERAGE ROUGHNESS ELEMENT 4 INCHES ABOVE THE GROUT LINE.
    - 13.5. OVERALL LONGITUDINAL GRADE WILL BE FORMED AT A SMOOTH SLOPE WITHOUT NOTICEABLE BREAKS IN GRADE.

SITE ACCESS, ENVIRONMENTAL AND OPEN SPACE NOTES:

1. SECTION 01010 DESCRIBES THE CONSTRUCTION VEHICLE ACCESS ROUTE.
2. CONSTRUCTION VEHICLE MOVEMENT ACROSS NATURAL SURFACES (SURFACES WITHOUT AN OBVIOUS GROUND TRAVEL SURFACE OR ESTABLISHED MOTORIZED VEHICLE USE) SHALL BE STRICTLY IN ACCORDANCE WITH INSTRUCTIONS PROVIDED BY ON-SITE OWNER'S REPRESENTATIVE. TRIPS ACROSS OPEN SPACE MANAGED LANDS SHALL BE KEPT TO A MINIMUM.
3. GRAVEL AND VEGETATED SURFACE WILL NOT BE USED WHEN ENVIRONMENTAL CONDITIONS (MOISTURE IN GROUND, ETC.) ARE UNSUITABLE FOR USE BY CONSTRUCTION VEHICLES WITHOUT CAUSING GROUND SURFACE DAMAGE.
4. RECLAIMED PONDS, AGRICULTURAL AREAS AND IRRIGATION FACILITIES SERVING THEM SHALL REMAIN UNDISTURBED BY CONSTRUCTION UNLESS SPECIFICALLY INDICATED OTHERWISE.
5. THE NUMBER OF VEHICLES NEEDED TO PERFORM WORK SHALL BE KEPT TO A MINIMUM. CAR POOLING FROM THE MAIN PUBLIC ROAD AND CONSOLIDATION OF EQUIPMENT ONTO ONLY A FEW VEHICLES IS REQUIRED.
6. ONCE ANY VEHICLE ENTERS ONTO OPEN SPACE MANAGED PROPERTY, THE MAXIMUM SPEED LIMIT SHALL BE 5 MPH. EMERGENCY FLASHERS ARE REQUIRED WHEN ON OPEN SPACE MANAGED PROPERTY. VEHICLES WILL YIELD TO OPEN SPACE VISITORS.
7. THE CONTRACTOR SHALL MANAGE HIS CONSTRUCTION OPERATIONS TO MINIMIZE VEHICLE SPILLS, VEHICLE TRACKING OF SOIL AND VEGETATION AND THE GENERATION OF FUGITIVE DUST TO BACKGROUND LEVELS AS MEASURE AT THE PROJECT LIMITS. CONTROL SHALL BE MANAGED USING NON-POINT SOURCE BEST MANAGEMENT PRACTICES. ANY UNACCEPTABLE DISCHARGES SHALL BE MITIGATED PROMPTLY IN ACCORDANCE WITH COLORADO DEPARTMENT OF HEALTH STANDARDS.
8. ALL GATES SHALL BE LEFT IN CONDITION FOUND, I.E., A CLOSED GATE SHALL BE LEFT CLOSED WITH EACH PASSAGE.
9. ALL CONTRACTOR VEHICLES SHALL HAVE AN "OPEN SPACE CONTRACTOR" CARD DISPLAYED ON THE DASHBOARD WHEN IN THE OPEN SPACE LANDS. VEHICLES WITHOUT CARDS ARE SUBJECT TO BEING TICKETED BY OPEN SPACE RANGERS. CARDS MAY BE OBTAINED BY CONTACTING MR. BOB CRIFASI.
10. KEYS TO ACCESS LOCKED GATES ON OPEN SPACE MAY BE OBTAINED BY CONTACTING MR. BOB CRIFASI.
11. ALL EQUIPMENT AND CONTAINERS IN CONTACT WITH WATER AND MUD FROM WATERS INFESTED WITH AQUATIC NUISANCE SPECIES (INCLUDING BOULDER CREEK AND GREEN DITCH) SHALL BE DECONTAMINATED IN THE FOLLOWING MANNER PRIOR TO LEAVING THE SITE WITH THAT EQUIPMENT AND CONTAINERS:
    - 11.1. EXTERIOR OF ALL EQUIPMENT AND CONTAINERS:
        - 11.1.1. REMOVE AND DESTROY ATTACHED AQUATIC NUISANCE SPECIES, ALL VISIBLE MUD, PLANTS AND ORGANISMS.
        - 11.1.2. THROUGHOUT WASH WITH HOT WATER (140° OR HOTTER) AND AS NECESSARY USE SCRUBBING OR HIGH PRESSURE WATER (MINIMUM OF 250 PSI).
    - 11.2. INTERIOR OF ALL EQUIPMENT AND CONTAINERS THAT MAY HOLD WATER SHALL BE FLUSHED WITH (140° OR HOTTER) BUT NOT AT HIGH PRESSURE.
12. THE PROJECT IS SCHEDULED TO OCCUR DURING THE TIME OF THE YEAR THAT TYPICALLY HAS LOW FLOW CONDITIONS. HOWEVER, THUNDERSTORMS ARE TYPICAL DURING THIS TIME OF YEAR AND HIGHER FLOWS MAY OCCUR FOR BRIEF PERIODS. THE CONTRACTOR MUST BE ABLE TO MANAGE ALL INCOMING FLOWS BY DIVERTING, PUMPING, OR PIPING THESE FLOWS SO THAT THERE IS MINIMAL TURBIDITY. NORMAL STREAM TURBIDITY IS EXPECTED TO BE LESS THAN 5 NTU. TURBIDITY DURING ACTIVE CONSTRUCTION SHALL NOT EXCEED 3 TIMES ACTUAL MEASURED BACKGROUND TURBIDITY OR 15 NTU, WHICHEVER IS GREATER, FOR A PERIOD LONGER THAN 15 MINUTES. ADDITIONAL MITIGATION MEASURES MUST BE APPLIED PROACTIVELY AS NECESSARY TO MEET THIS STANDARD. SHOULD TURBIDITY AT ANY TIME EXCEED 50 NTU, CONSTRUCTION SHALL CEASE IMMEDIATELY UNTIL TURBIDITY LEVELS ARE RESTORED TO LESS THAN THE NON-EXCEEDENCE LEVEL.

ABBREVIATIONS:

AB	ANCHOR BOLT
APPROX	APPROXIMATELY
BC	BEARING CAPACITY
BLKT	BLOCKOUT
B.O.	BOTTOM OF
BOT	BOTTOM
BRG	BEARING
CBC	CONCRETE BOX CULVERT
CJ	CONSTRUCTION JOINT
CLR	CLEAR OR CLEARANCE
CMP	CORRUGATED METAL PIPE
CNTD	CENTERED
CONC	CONCRETE
CONT	CONTINUOUS
DET	DETAIL
DIPS	DUCTILE IRON PIPE SIZE
DN	DOWN
EA	EACH
ELEV, EL	ELEVATION
EMBED	EMBEDMENT OR EMBEDDED
EW	EACH WAY
GALV	GALVANIZED
HDG	HOT-DIPPED GALVANIZED
HGL	HYDRAULIC GRADE LINE
HOR	HORIZONTAL
H&V	HORIZONTAL AND VERTICAL
HT	HEIGHT
ID	INNER DIAMETER
INV	INVERT
JT	JOINT
LOC	LOCATION
LONG	LONGITUDINAL
MAX	MAXIMUM
MIN	MINIMUM
NIC	NOT IN CONTRACT
No.	NUMBER
NOM	NOMINAL
OC	ON CENTER
OCEW	ON CENTER EACH WAY
OD	OUTER DIAMETER
OPNG	OPENING
PROJ	PROJECTION
RECT	RECTANGULAR
REINF	REINFORCING; REINFORCEMENT
REQ'D	REQUIRED
SEO	COLORADO OFFICE OF THE STATE ENGINEER
SCH	SCHEDULE
SECT	SECTION
SIM	SIMILAR
SPC'G	SPACING
SS	STAINLESS STEEL
STD	STANDARD
STL	STEEL
T&B	TOP AND BOTTOM
TOW	TOP OF WALL
T.O.	TOP OF
TRANSV	TRANSVERSE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VERT	VERTICAL
W/	WITH
W/I	WITHIN
WSE	WATER SURFACE ELEVATION

NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY TECHNICAL SPECIFICATIONS DATED NOVEMBER 2011.

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PROJECTION:	N/A
DRAWN BY:	KAP (GEI)
REVIEWED BY:	DRL (GEI)
ORIGINAL SCALE:	AS SHOWN

PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: NOTES
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO.:	8276556000.003
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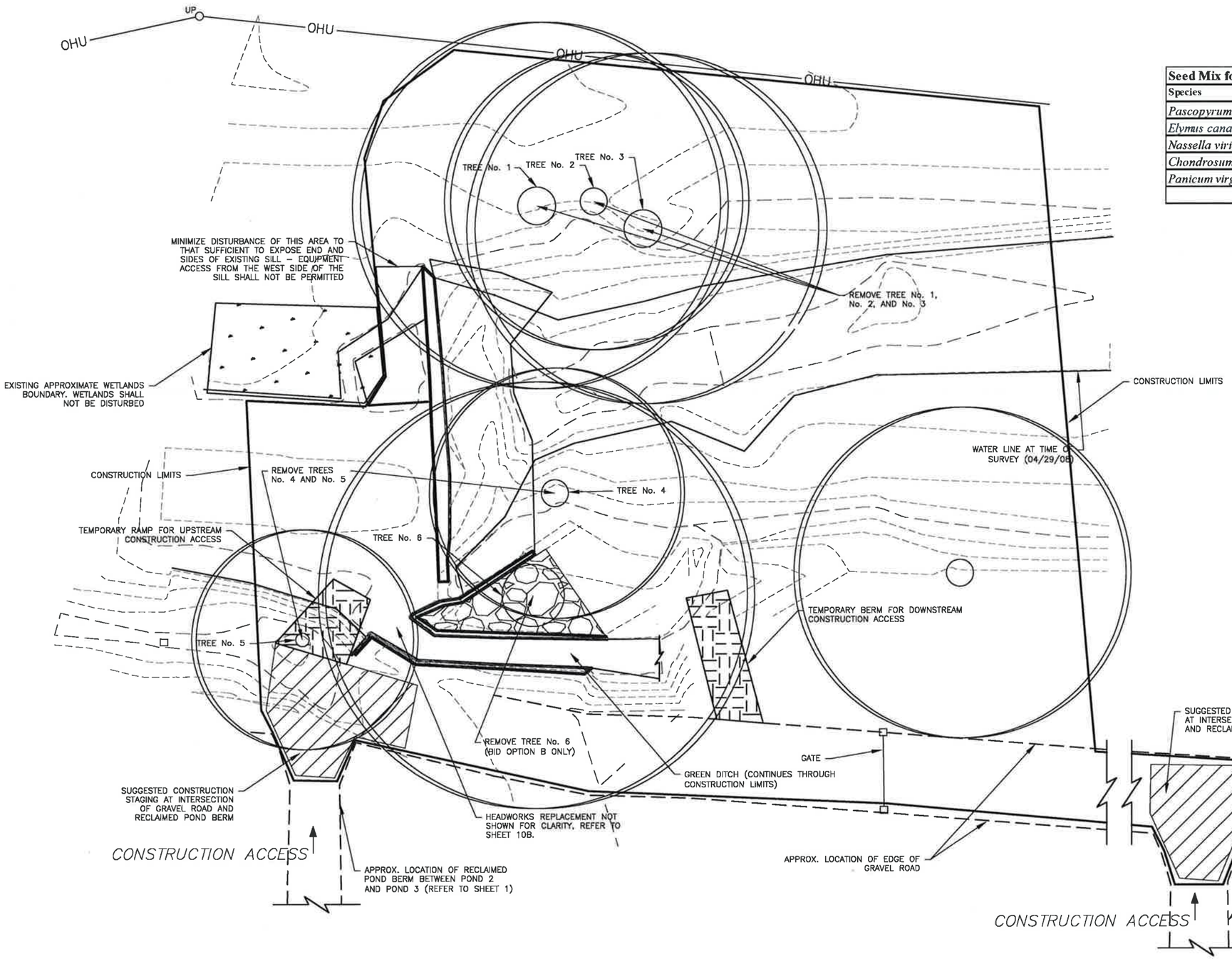
SHEET NO.:	2 of 12



Seed Mix for Green Ditch Irrigation Diversion Replacement and Fishway				
Species	**Common Name**	**Variety**	**Percent of Mix**	**Lbs. PLS/acre**
Pascopyrum smithii	Western wheatgrass	Arriba	25	**8**
Elymus canadensis	Canada wildrye	Mandan	20	**4**
Nassella viridula	Green needlegrass	Lodorm	15	**3**
Chondrosum gracile	Blue grama	Native or Bad River	20	**1.2**
Panicum virgatum	Switchgrass	Dacotah	20	**1.6**
			Total Lbs. PLS/acre	**17.8**

COLORADO REGISTERED PROFESSIONAL ENGINEER DOUGLAS R. LAMO 16626
12/08/2011

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PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: CONSTRUCTION ACCESS, STAGING, AND TREE REMOVAL
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO.:	8276556000.003
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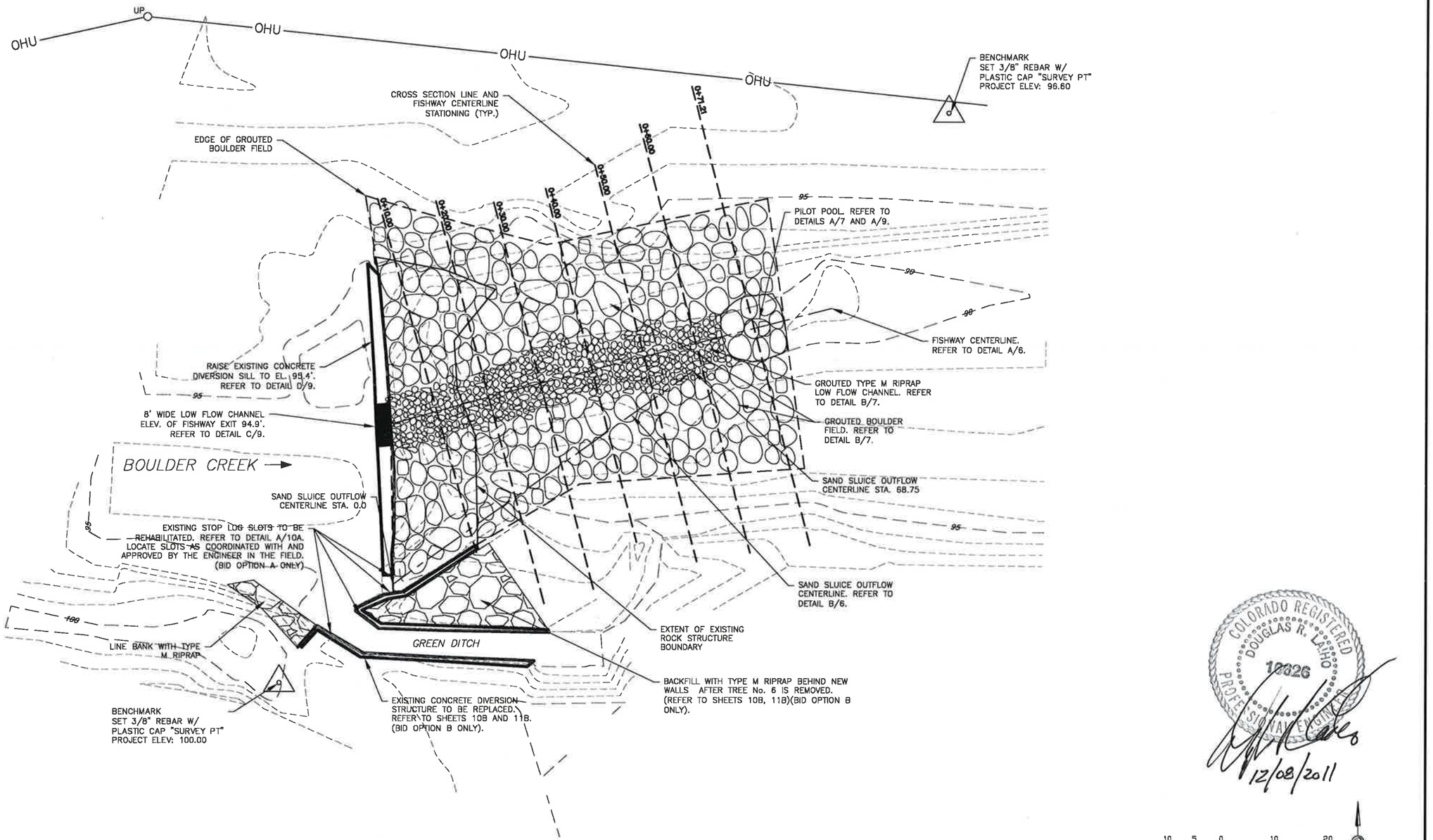

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PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: GENERAL PLAN
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO:	8276556000.003
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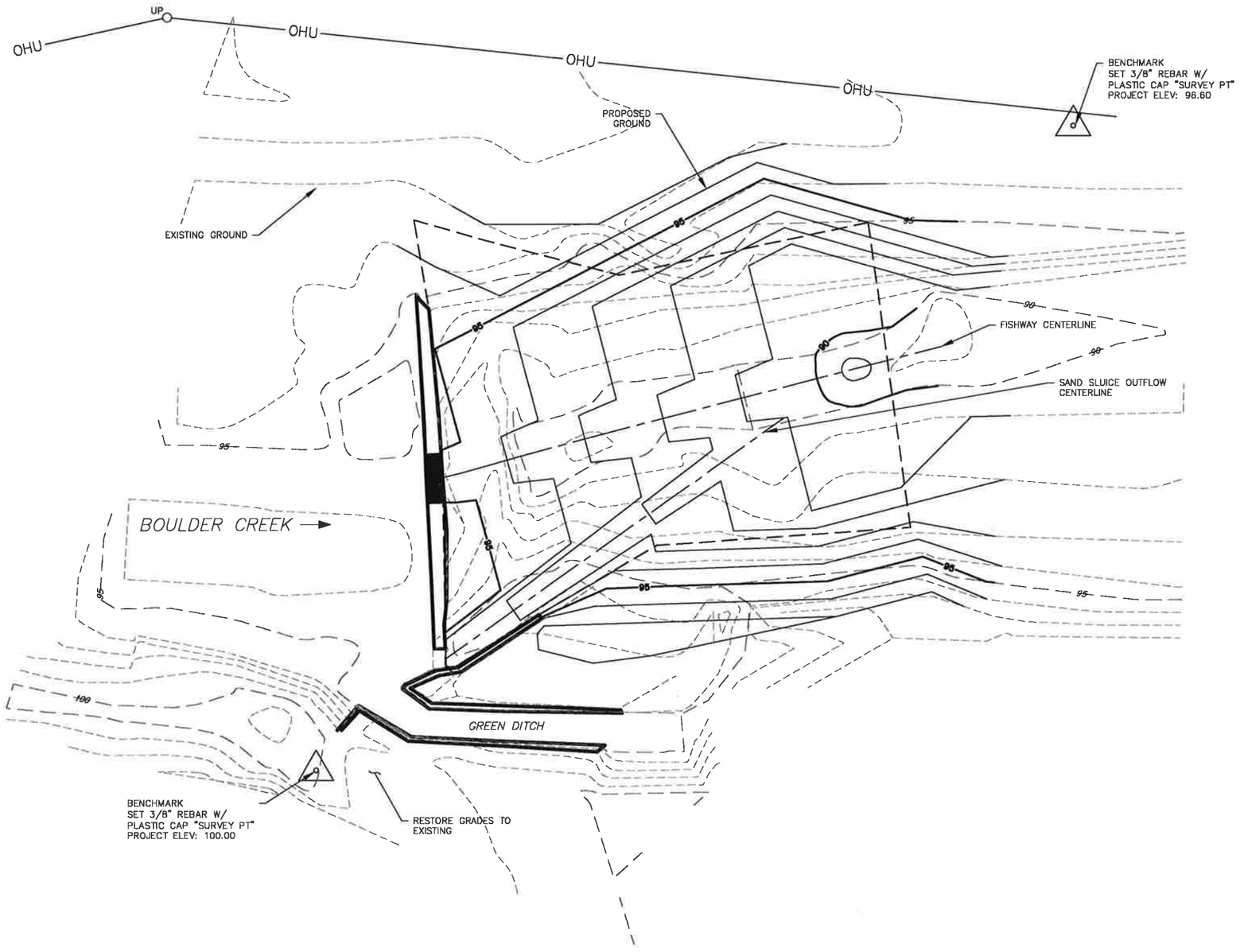

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PROFESSIONAL ENGINEER

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10 5 0 10 20
SCALE: 1" = 10'

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PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: GRADING PLAN
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO.	8276556000.003
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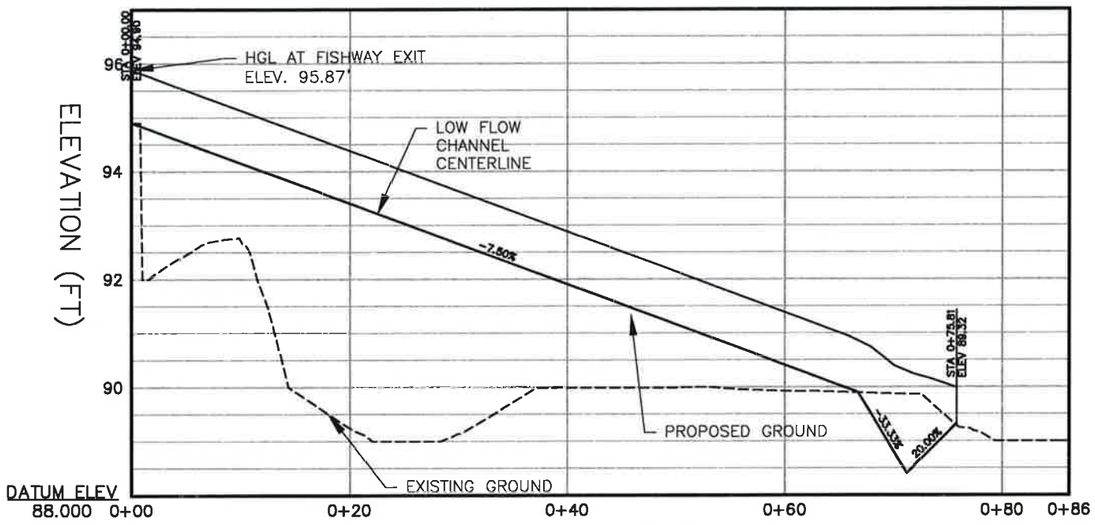
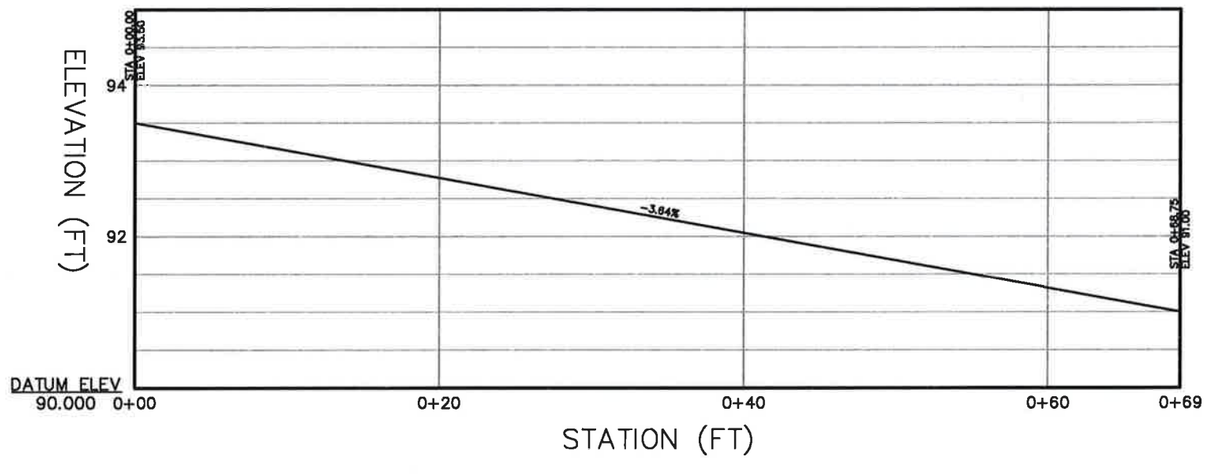


A/6 FISHWAY PROFILE
SCALE AS SHOWN



B/6 SAND SLUICE OUTFLOW CHANNEL PROFILE
SCALE AS SHOWN

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PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: FISH PASSAGEWAY AND SAND SLUICE PROFILES
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO:	8276556000.003
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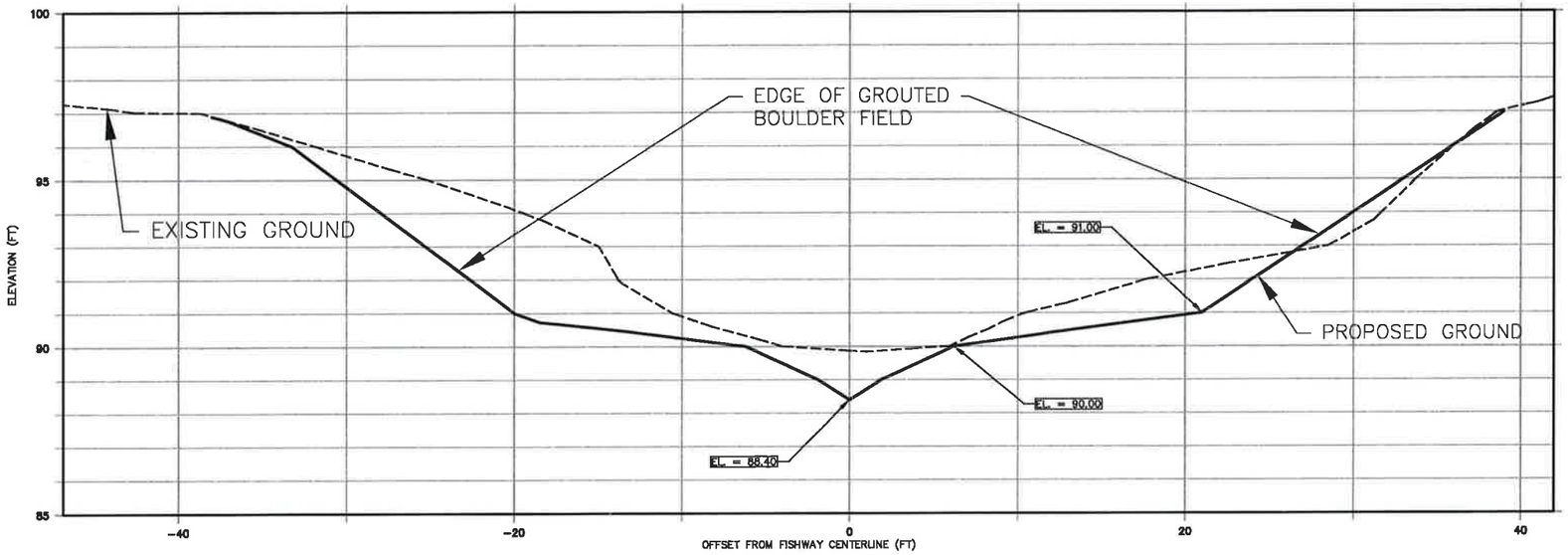
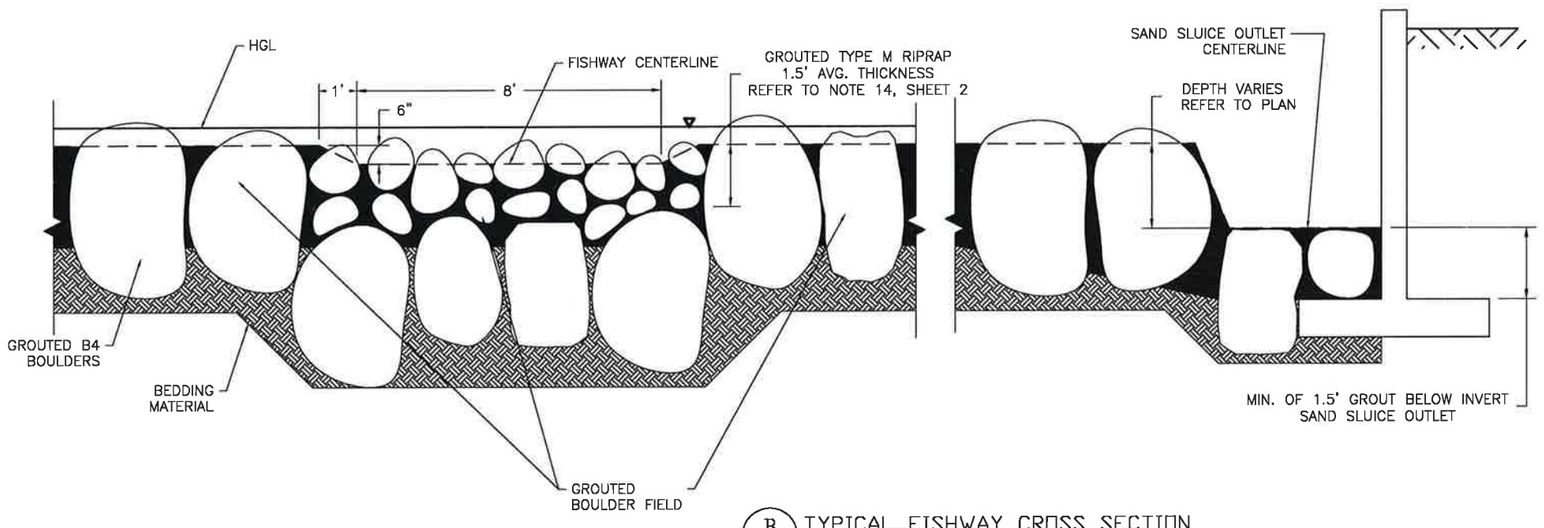
PILOT POOL CROSS SECTION



A/7 PILOT POOL CROSS SECTION
SCALE AS SHOWN



B/7 TYPICAL FISHWAY CROSS SECTION
1"=2'

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SCALE: 1" = 2'

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PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: CROSS SECTIONS
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO.	8276556000.003
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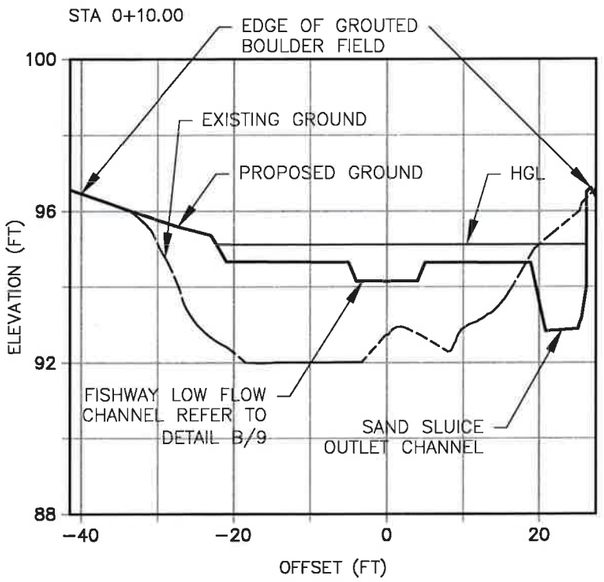

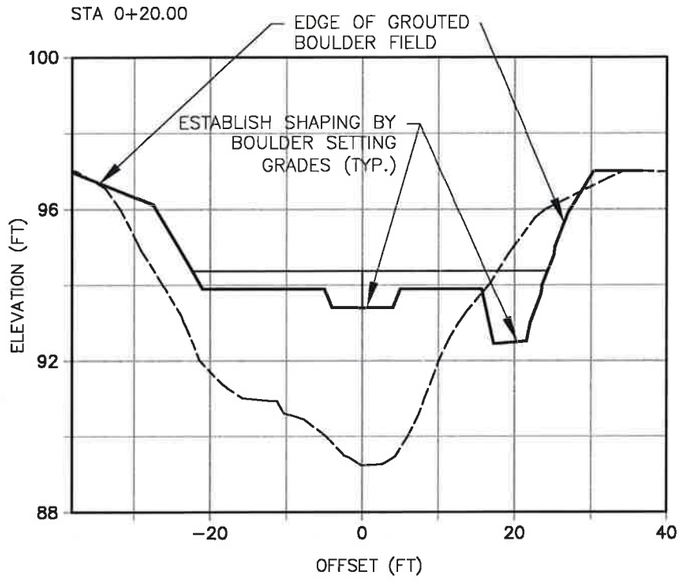

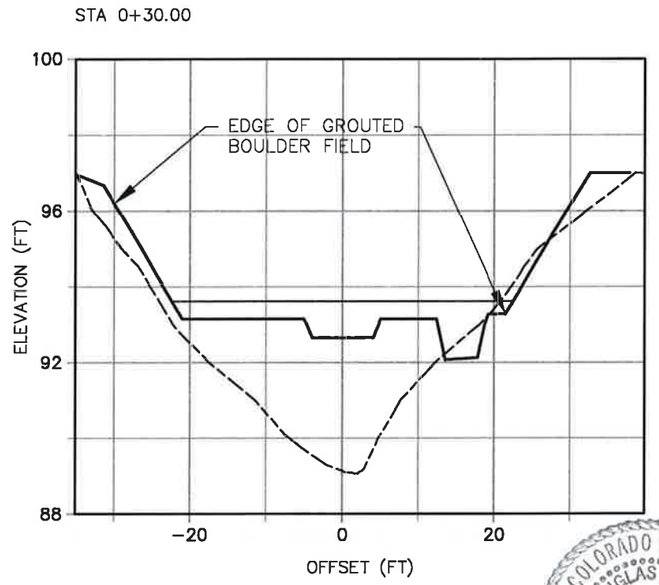

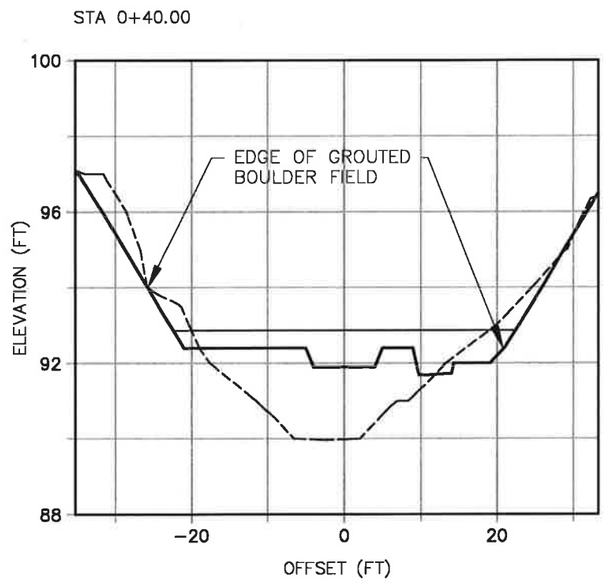

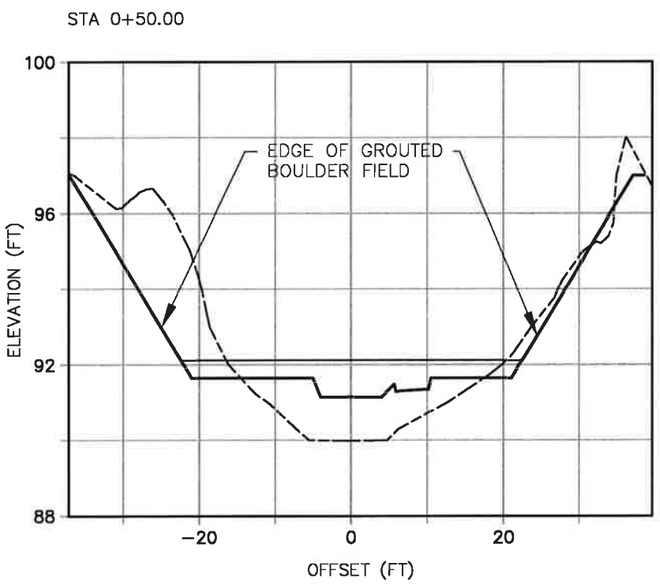

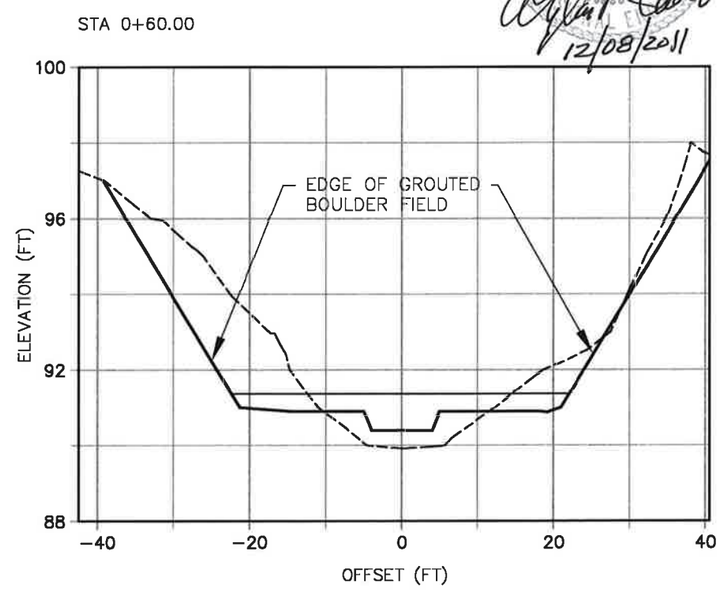

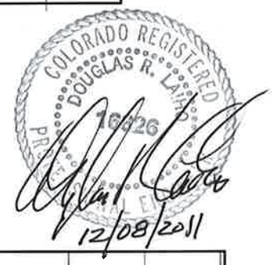

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Colorado Center Tower Two
2000 S. Colorado Blvd., Suite 2-1000
Denver, CO 80222

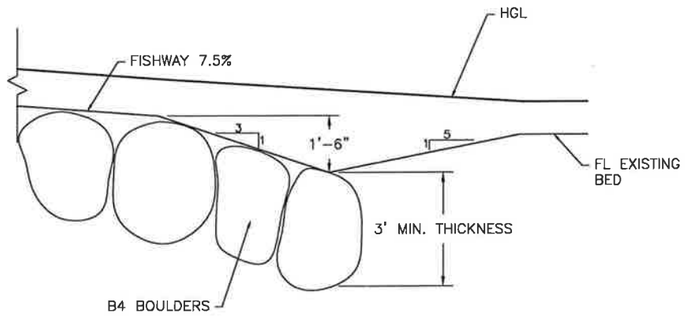
GEI Consultants
4601 DTC Blvd
Denver, CO 80237
303 662 0100
www.geiconsultants.com

DATUM:	N/A
PROJECTION:	N/A
DRAWN BY:	KAP (GEI)
REVIEWED BY:	DRL (GEI)
ORIGINAL SCALE:	AS SHOWN

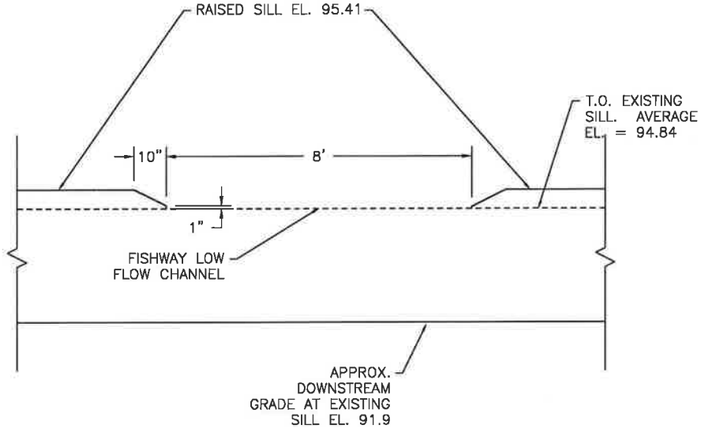
PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: CROSS SECTIONS
APPLICABLE TO BID OPTIONS A AND B

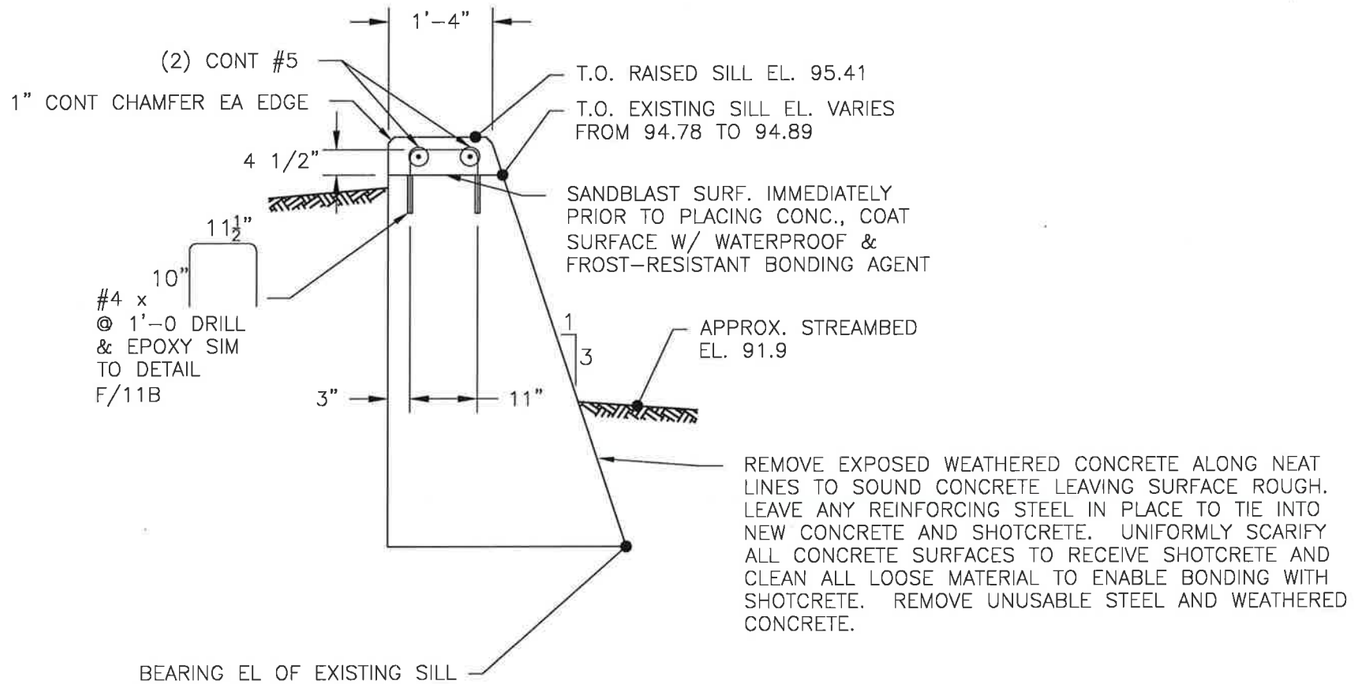
PROJECT NO.:	8278556000.003
REVISION NO.	
DATE:	November 2011
DRAWING NO.	
SHEET NO.:	8 of 12



A/9 PILOT POOL LONGITUDINAL SECTION
1"=2'



B/9 DIVERSION SILL AT FISHWAY EXIT
1"=2'



C/9 DIVERSION SILL CROSS SECTION
1"=1'

1 0.5 0 1 2
SCALE: 1" = 1'

2 1 0 2 4
SCALE: 1" = 2'

NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY TECHNICAL SPECIFICATIONS DATED NOVEMBER 2011.

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City of Boulder

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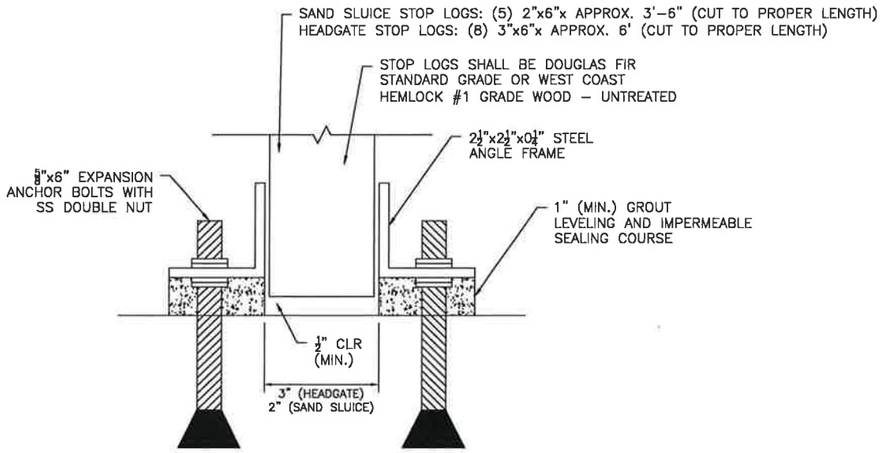
DRAWN BY: KAP (GEI)
REVIEWED BY: DRL (GEI)
ORIGINAL SCALE: AS SHOWN

PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: DETAILS
APPLICABLE TO BID OPTIONS A AND B

PROJECT NO.: 8276556000.003
REVISION NO
DATE: November 2011
DRAWING NO.:
SHEET NO.: 9 of 12



A / 10A STOP LOG SLOT DETAIL
1"=2"

JOAN X. GILLETTE 12986 12-6-11 PROFESSIONAL ENGINEER STATE OF COLORADO

COLORADO REGISTERED DOUGLAS R. LATKO 16029 PROFESSIONAL ENGINEER

12/08/2011

2 1 0 2 4
SCALE: 1" = 2"

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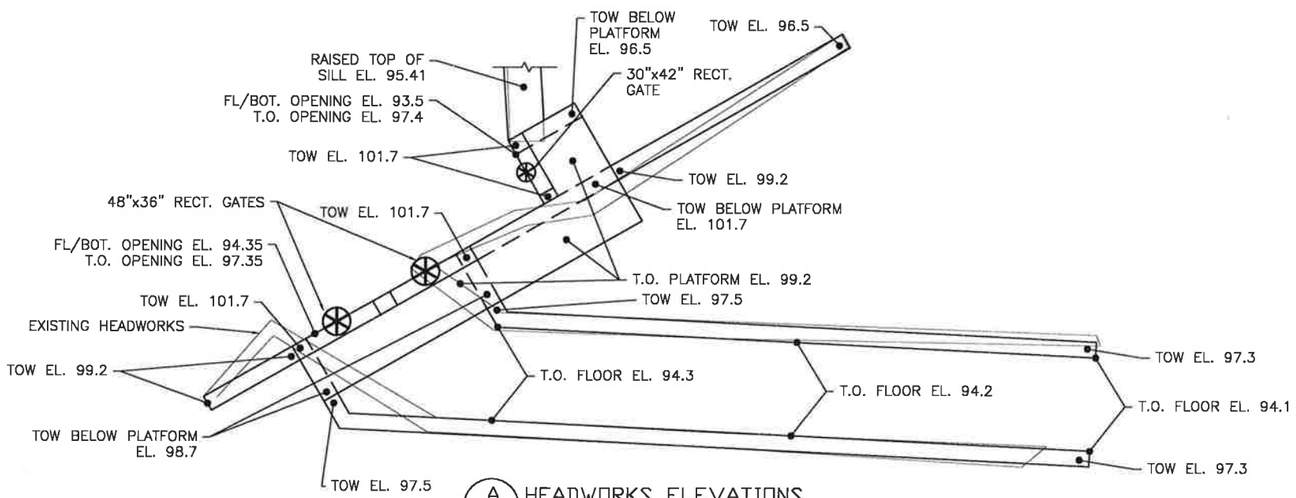
DRAWN BY: KAP (GEI)
REVIEWED BY: DRL (GEI)
ORIGINAL SCALE: AS SHOWN

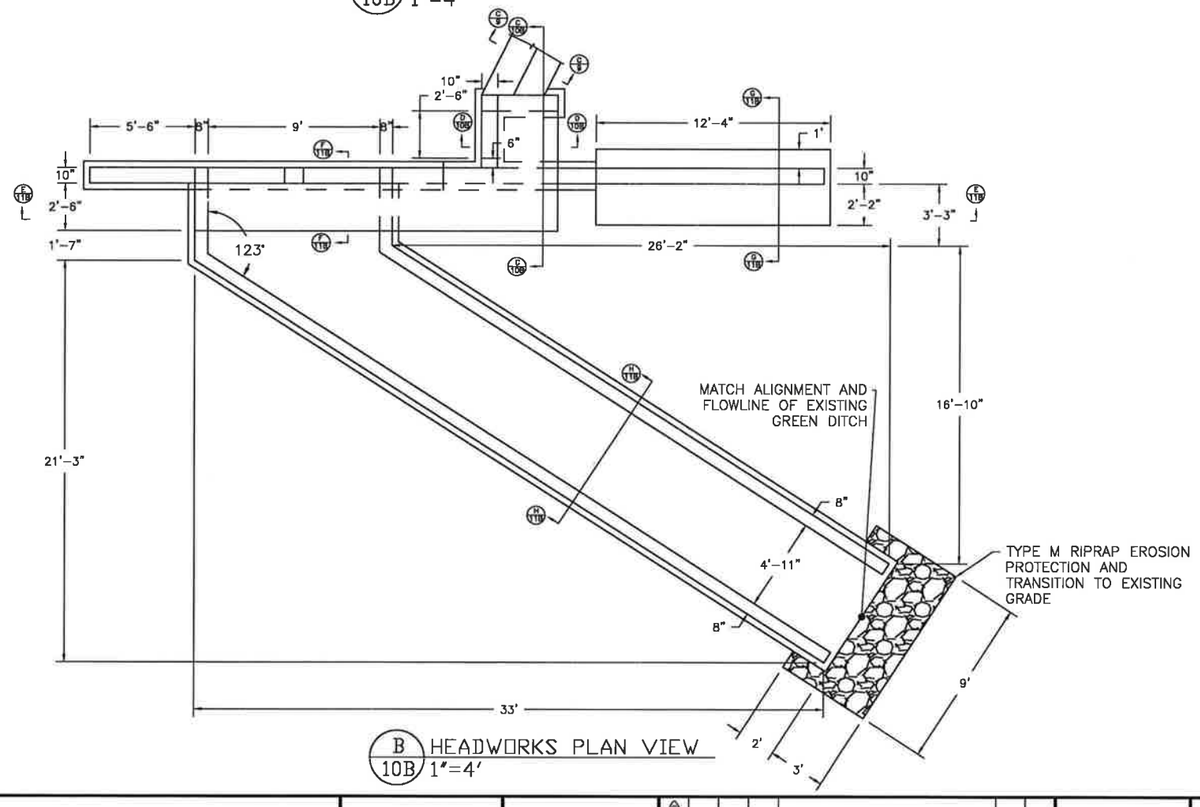
PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: DETAILS
APPLICABLE TO BID OPTION A

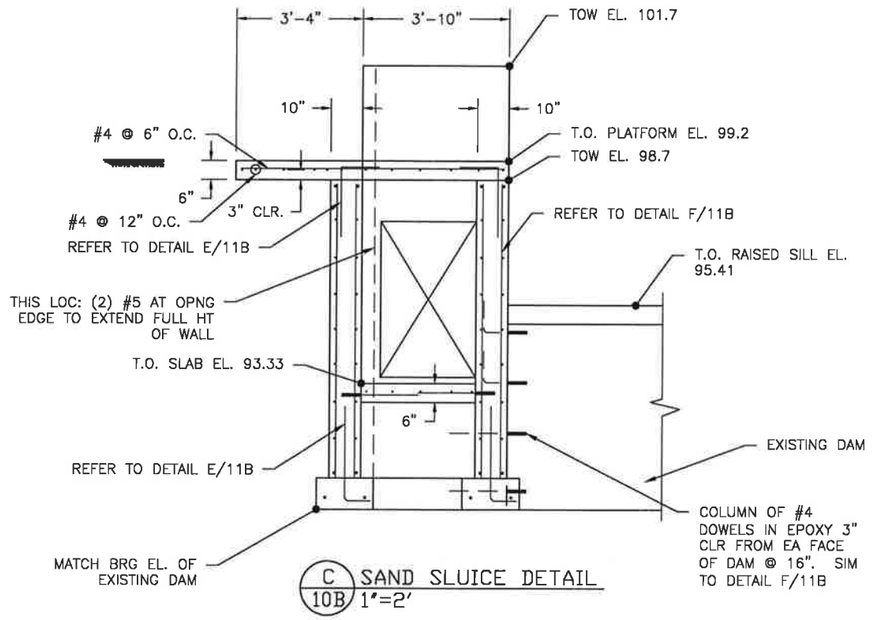
PROJECT NO.: 8276558000.003
REVISION NO.:
DATE: November 2011
DRAWING NO.:
SHEET NO.: 10A of 12



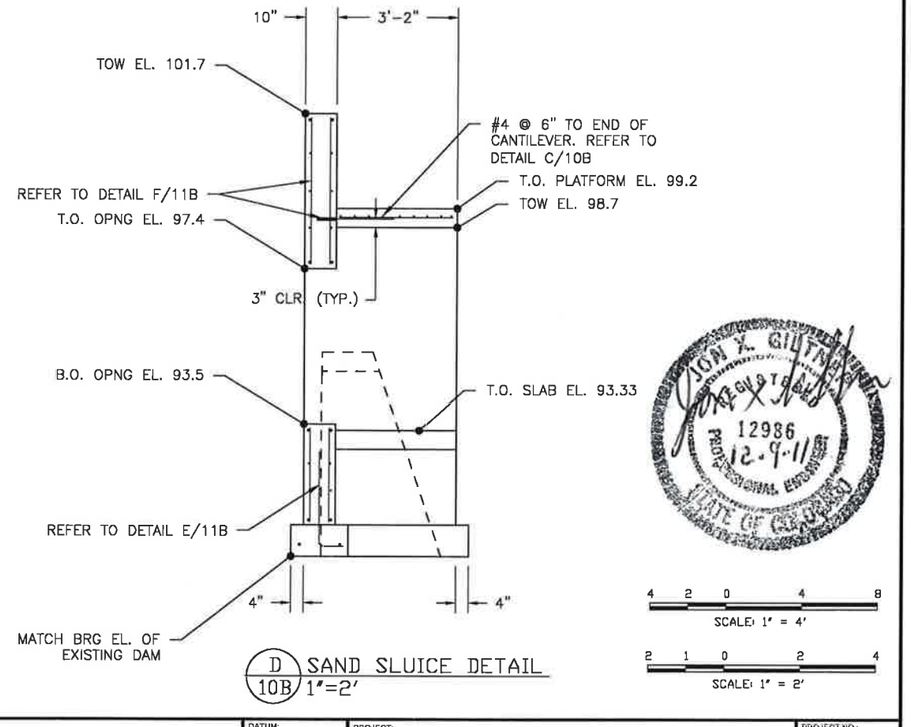
A 10B HEADWORKS ELEVATIONS
1"=4'



B 10B HEADWORKS PLAN VIEW
1"=4'



C 10B SAND SLUICE DETAIL
1"=2'



D 10B SAND SLUICE DETAIL
1"=2'

JON X. GILTNER
REGISTERED
12986
12-9-11
PROFESSIONAL ENGINEER
STATE OF COLORADO

SCALE: 1" = 4'

SCALE: 1" = 2'

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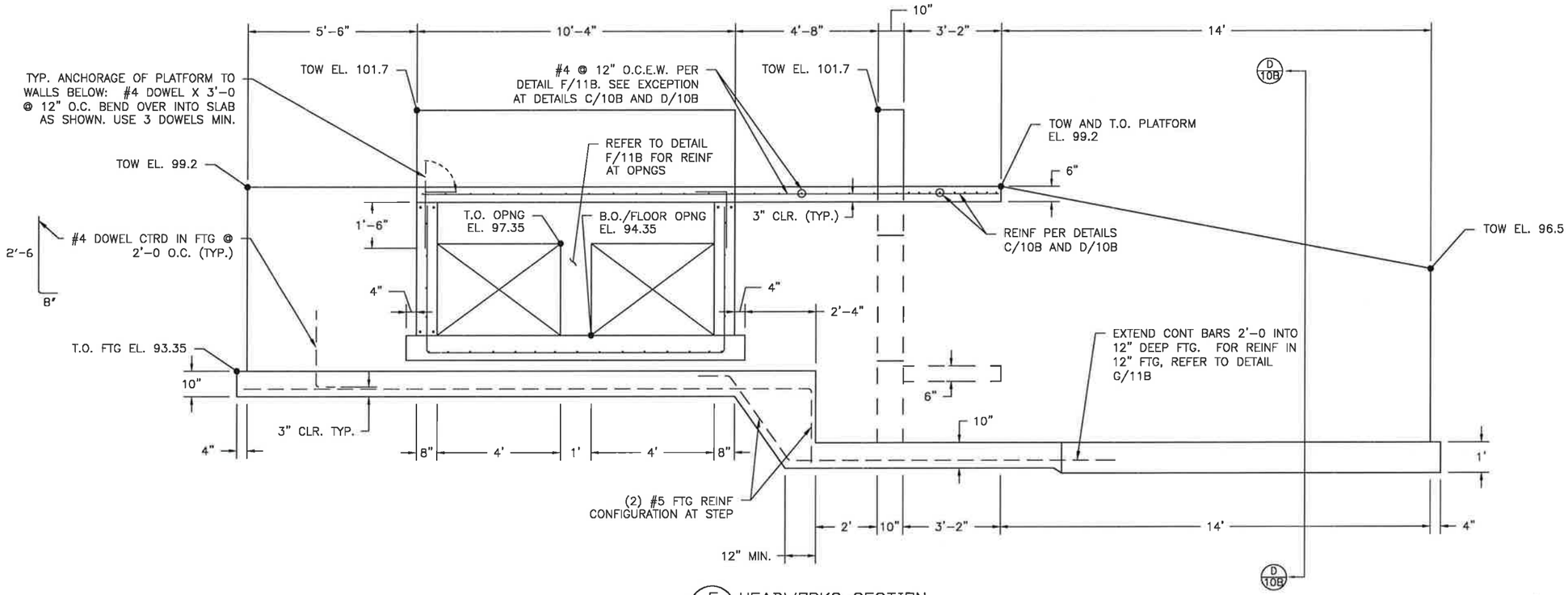
REVIEWED BY:	DRL (GEI)
ORIGINAL SCALE:	AS SHOWN

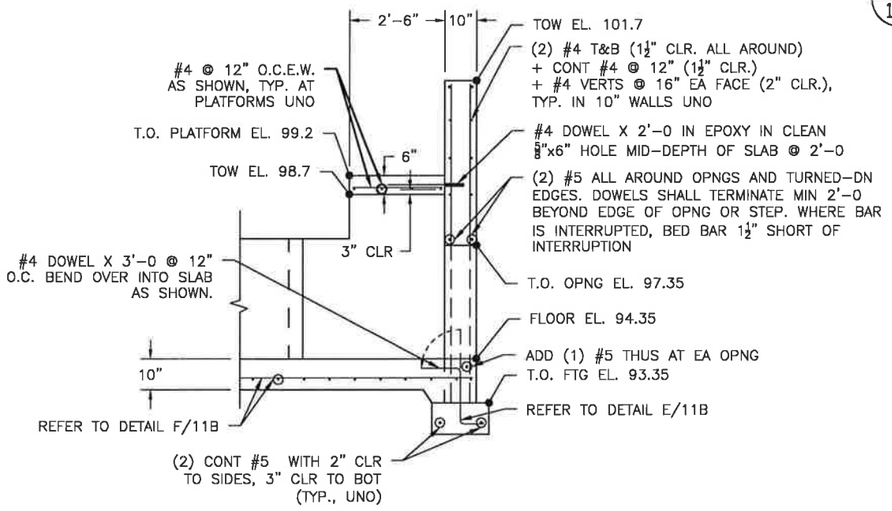
PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: DETAILS
APPLICABLE TO BID OPTION B

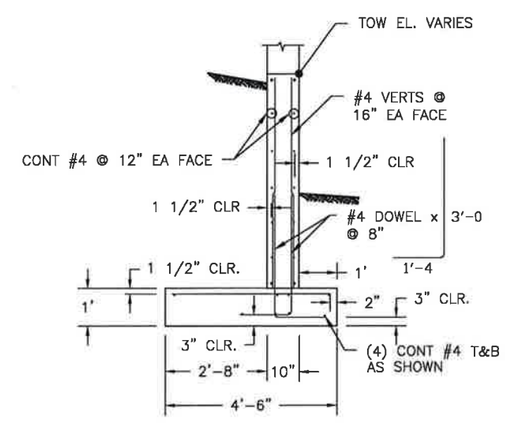
PROJECT NO.:	8276556000.003
REVISION NO.	
DATE:	November 2011
DRAWING NO.:	
SHEET NO.:	10B of 12



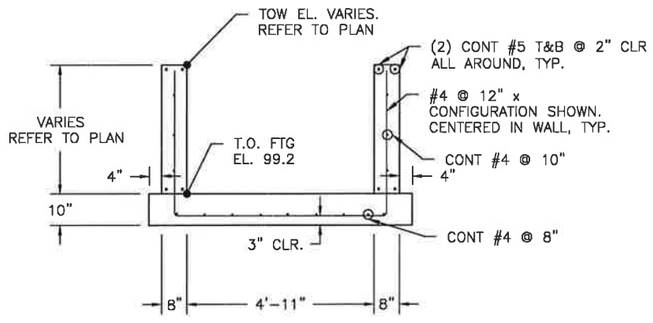
E 11B HEADWORKS SECTION
1"=2'



F 11B HEADWORKS DETAIL
1"=2'



G 11B WALL DETAIL
1"=2'



H 11B WALL DETAIL
1"=2'

2 1 0 2 4
SCALE: 1" = 2'

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PROJECT: GREEN DITCH IRRIGATION DIVERSION REPLACEMENT AND FISHWAY

TITLE: DETAILS
APPLICABLE TO BID OPTION B

PROJECT NO.:	8276556000.003
REVISION NO.	
DATE:	November 2011
DRAWING NO.:	
SHEET NO.:	11B of 12

Green Ditch Diversion Rehabilitation and Fish Passageway
11/1/2011
Prices are in 2011 USD

Bid Option A - Repair of Stop Log System

Bid Item	Description	Unit	Quantity	Unit Price	Total Amount
1A	Mobilization/Demobilization	LS	1	$ 11,000.00	$11,000.00
2.1A	Tree No. 1 Removal	EA	1	$ 1,750.00	$1,750.00
2.2A	Tree No. 2 Removal	EA	1	$ 1,750.00	$1,750.00
2.3A	Tree No. 3 Removal	EA	1	$ 1,750.00	$1,750.00
2.4A	Tree No. 4 Removal	EA	1	$ 1,750.00	$1,750.00
2.5A	Tree No. 5 Removal	EA	1	$ 1,500.00	$1,500.00
3A	Clearing and Grubbing	LS	1	$ 1,500.00	$1,500.00
4A	Anthropogenic Debris Removal and Disposal	CY	3	$ 150.00	$450.00
5A	Surplus and Organic Debris Removal and Disposal	CY	5	$ 40.00	$200.00
6A	Handling Water	LS	1	$ 4,000.00	$4,000.00
7A	Class 5 Road Base	TN	65	$ 20.00	$1,300.00
8A	Diversion Sill Raise	LS	1	$ 7,500.00	$7,500.00
9A	Roughened Channel Rock Ramp	LS	1	$ 75,000.00	$75,000.00
10A	Type M Riprap	SY	6	$ 175.00	$1,050.00
11A	Grading	LS	1	$ 4,000.00	$4,000.00
12A	Topsoil	CY	20	$ 40.00	$800.00
13A	Restoration	LS	1	$ 1,500.00	$1,500.00
14.1A	Stop Log Mounting and Stop Logs - Headgate	LS	1	$ 1,000.00	$1,000.00
14.2A	Stop Log Mounting and Stop Logs - Sand Sluice	LS	1	$ 1,000.00	$1,000.00
				TOTAL	**$118,800.00**

Green Ditch Diversion Rehabilitation and Fish Passageway
11/1/2011
Prices are in 2011 USD

Bid Option B - Replacement of Headworks

Bid Item	Description	Unit	Quantity	Unit Price	Total Amount
1B	Mobilization/Demobilization	LS	1	$ 20,000.00	$20,000.00
2.1B	Tree No. 1 Removal	EA	1	$ 1,750.00	$1,750.00
2.2B	Tree No. 2 Removal	EA	1	$ 1,750.00	$1,750.00
2.3B	Tree No. 3 Removal	EA	1	$ 1,750.00	$1,750.00
2.4B	Tree No. 4 Removal	EA	1	$ 1,750.00	$1,750.00
2.5B	Tree No. 5 Removal	EA	1	$ 1,500.00	$1,500.00
2.6B	Tree No. 6 Removal	EA	1	$ 2,500.00	$2,500.00
3B	Clearing and Grubbing	LS	1	$ 2,000.00	$2,000.00
4B	Anthropogenic Debris Removal and Disposal	CY	32	$ 150.00	$4,800.00
5B	Surplus and Organic Debris Removal and Disposal	CY	8	$ 40.00	$320.00
6B	Handling Water	LS	1	$ 6,000.00	$6,000.00
7B	Class 5 Road Base	TN	65	$ 20.00	$1,300.00
8B	Diversion Sill Raise	LS	1	$ 7,500.00	$7,500.00
9B	Roughened Channel Rock Ramp	LS	1	$ 75,000.00	$75,000.00
10B	Type M Riprap	SY	34	$ 175.00	$5,950.00
11B	Grading	LS	1	$ 10,000.00	$10,000.00
12B	Topsoil	CY	28	$ 40.00	$1,120.00
13A	Restoration	LS	1	$ 2,500.00	$2,500.00
14B	Demolish Existing Headworks	LS	1	$ 7,000.00	$7,000.00
15B	New Headworks Structure	LS	1	$ 50,000.00	$50,000.00
16.1B	30"x42" Rectangular Sluice Gate	EA	1	$ 4,500.00	$4,500.00
16.2B	48"x36" Rectangular Headgate	EA	2	$ 5,000.00	$10,000.00
				TOTAL	**$218,990.00**

WSRA Statewide Funds for Environmental and/or Recreational Purposes

(Highlighted Projects are projects that have a diversion structure reconstruction component)

Name of Water Activity	Basin Account	Statewide Account	Total
Arkansas Basin Roundtable			
Bedload/Sediment Collection and Removal Technology - Fountain Creek	$75,000.00	$150,000.00	$225,000.00
Helena Diversion Structure/BV Boat Chute Improvement Project	$35,000.00	$290,000.00	$325,000.00
Fountain Creek Bank Restoration at the Frost Ranch	$30,000.00	$75,000.00	$105,000.00
Bear Creek Sediment Mitigation Project (Phase I)	$15,000.00	$85,000.00	$100,000.00
Royal Gorge Wildfire Water Quality Impact and Protection Project –	$24,260.00	$460,940.00	$485,200.00
Arkansas Headwaters Diversion Structure Improvement Project Arkansas River Basin		$57,954.50	$57,954.50
Colorado Basin Roundtable			
Upper Colorado Endangered Fish Recovery Alternatives Analysis (10,825)		$200,000.00	$200,000.00
Fraser Sedimentation Basin	$60,000.00	$127,900.00	$187,900.00
Tenmile Creek Restoration Project	$17,500.00	$332,500.00	$350,000.00
Colorado River Restoration and Conservation Projects	$20,000.00	$90,000.00	$110,000.00
Crystal River Watershed – Assessment and Design of Restoration	$15,854.00	$288,610.00	$304,464.00
Grand Valley Riparian Restoration Collaborative (GVRRC) Project	$42,726.00	$207,274.00	$250,000.00
Gore Canyon Whitewater Park at pumphouse - Colorado River	$100,000.00	$400,000.00	$500,000.00
Gunnison Basin Roundtable			
Paonia-Feldman Diversion Reconstruction; North Fork of the Gunnison River (Part 1 and 2)	$48,000.00	$62,700.00	$110,700.00
Lake San Cristobal Outlet Structure Modification--Phase III		$120,960.00	$120,960.00

Lake San Cristobal Inlet Preservation and Fishing Access Project	$16,700.00	$150,300.00	$167,000.00
Henson Creek and Lake Fork Confluence Channel Improvements	$28,975.00	$260,111.00	$289,086.00
Curry Easements Woody Invasives Removal Project - West Side of the North Fork of the Gunnison River	$4,800.00	$43,200.00	$48,000.00
Somerset Diversion Improvement Study – North Fork of the Gunnison River Corridor Project	$4,800.00	$43,200.00	$48,000.00
Metro Basin Roundtable			
South Platte River Recreation and Habitat Improvement Preliminary Design	$25,000.00	$100,000.00	$125,000.00
South Platte & Metro Integrated Basin Implementation Plan – Nonconsumptive	$58,000.00	$29,500.00	$87,500.00
Plum Valley Heights Water Supply Pipeline	$50,000.00		$50,000.00
Josh Ames Diversion Removal on Poudre River	$25,000.00	$100,000.00	$125,000.00
Grant-Frontier Park West Bank Riparian Floodplain Design and Construction Project	$100,000.00	$250,000.00	$350,000.00
North Platte Basin Roundtable			
Identification and assessment of important wetlands in N.P. River watershed	$86,000.00	$96,000.00	$182,000.00
Rio Grande Basin Roundtable			

Preliminary Design Multi-use Rio Grande Reservoir Rehabilitation and Enlargement		$288,000.00	$288,000.00
Alamosa River Watershed Restoration Project		$104,000.00	$104,000.00
Rio Grande Initiative	$200,000.00	$1,300,000.00	$1,500,000.00
Santa Maria and Continental Reservoirs: Rehabilitation and Multiple Use Studies	$72,000.00	$141,700.00	$213,700.00
2008 Rio Grande Riparian Stabilization Project	$35,000.00	$250,000.00	$285,000.00
Conejos River and North Branch Diversion and Stabilization	$50,000.00	$333,700.00	$383,700.00
Lower Willow Creek Restoration Project	$50,000.00	$200,000.00	$250,000.00
Sangre de Cristo Trinchera Diversion Canal Restoration	$50,000.00	$200,000.00	$250,000.00
Rio Grande Initiative: North Rio Grande Ranch Conservation Easement	$15,000.00	$55,000.00	$70,000.00
Rio Grande Initiative: Haywood Ranch Conservation Easement	$25,000.00	$400,000.00	$425,000.00
South Platte Basin Roundtable			
Lower South Platte Wetland Initiative Phase I South Platte River, CO		$278,476.00	$278,476.00
S.P. Water protection and restoration		$825,552.00	$825,552.00

Arickaree River Well retirement program, Republican River basin, CO.	$19,984.00	$79,936.00	$99,920.00
Halligan Seaman Water Mgmt project share vision planning model	$25,435.00	$76,305.00	$101,740.00
FMRICo Recharge & Wetlands Project	$250,000.00	$420,000.00	$670,000.00
Development of Decision Support Model for Identifying & Ranking Waterfowl and Wildlife Related Recharge Projects along the South Platte River		$85,421.00	$85,421.00
South Platte River Recreation and Habitat Improvement Preliminary Design	$25,000.00	$100,000.00	$125,000.00
South Platte River Phreatophyte Control Pilot	$35,000.00	$30,000.00	$65,000.00
Denver South Platte River Implementation Project - Frontier/Overland Final Design	$25,000.00	$300,000.00	$325,000.00
Prewitt Reservoir Wetland Partnership	$45,414.00	$45,414.00	$90,828.00
Josh Ames Diversion Removal on Poudre River	$75,000.00	$100,000.00	$175,000.00
South Platte & Metro Integrated Basin Implementation Plan – Nonconsumptive	$58,000.00	$29,500.00	$87,500.00
Southwest Basin Roundtable			
Lower Blanco River Restoration Project		$150,000.00	$150,000.00
Mancos River Habitat and Diversion Project - Phase 2	$20,000.00	$99,340.00	$119,340.00