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Managing Water in the West

Colorado River Storage Project Memorandum of Agreement Planning Report for the State of Colorado

Western Colorado Area Office, Upper Colorado Region, Colorado

U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

August 2014

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Abbreviations and Acronyms

Association	Animas-La Plata Operations, Maintenance, and Replacement Association
BPWCD	Bostwick Park Water Conservancy District
CCDC	Crawford Clipper Ditch Company
CCRC	Cimarron Canal and Reservoir Company
DWCD	Dolores Water Conservancy District
FIC	Farmers Irrigation Company
FMCRC	Fire Mountain Canal and Reservoir Company
FWCD	Florida Water Conservancy District
ITRC	Irrigation Training and Research Center
MOA	Memorandum of Agreement
NFWCD	North Fork Water Conservancy District
SWCD	Silt Water Conservancy District
UVWUA	Uncompahgre Valley Water Users Association

Introduction

This report discusses the findings of a planning effort associated with the January 24, 2011, Memorandum of Agreement (MOA) Concerning the Upper Colorado River Basin Fund (Basin Fund).

The bulk of this report is dedicated to descriptions of activities identified by irrigation districts that may be considered for possible CRSP MOA funding. Background information and the purpose of the planning effort are discussed, as well as a brief description of the planning process, as part of the introduction.

The introduction is followed by a summary of findings that consists of a summary of the activities that may be considered by the State of Colorado, cost estimates, and a funding discussion.

The activities are presented by facility and include descriptions and associated conceptual designs and cost estimates.

Background and Purpose

This report was prepared by the Bureau of Reclamation (Reclamation) to assist the Colorado Water Conservation Board (CWCB) with planning activities associated with Basin Fund MOA.

The Basin Fund MOA pertains to the collection and use of revenues as authorized by the 1956 Colorado River Storage Project (CRSP) Act (Public Law 485). The parties to the MOA include the States of Colorado, New Mexico, Utah and Wyoming; the Colorado River Energy Distributors Association, Inc.; the U.S. Department of the Interior, Bureau of Reclamation; and the Department of Energy, Western Area Power Administration. The CWCB represents Colorado in the implementation of the MOA.

Under the MOA, the parties have agreed to the collection of an average of $11,500,000 per year in hydropower revenues beginning in fiscal year (FY) 2012 and continuing through FY 2025, for a total of $161,000,000. These "MOA revenues" are to be used to further the purposes of the CRSP Act by implementing "projects recommended by the non-Federal parties.". The recommended improvements are to include expanded or extraordinary operation, maintenance, and replacement (OM&R) activities, including water conservation and environmental compliance activities as specified in the MOA's Appendix A. Reclamation considers extraordinary OM&R items to be major nonrecurring items as opposed to routine OM&R items. MOA revenues cannot be used for new construction; such as items that would increase water storage capacity (e.g., new storage reservoirs or dam raises) or expand a delivery system (e.g., new

canals). The MOA states that the revenues "shall be assigned to projects within each of the four Upper Division States as follows: Colorado, 46.0%; New Mexico, 17.0%; Utah, 21.5%; and Wyoming, 15.5%; provided, however, that nothing herein shall prevent any state that otherwise lacks projects that qualify for MOA revenues to allow, at the sole discretion of the state, its assigned MOA revenues to be reallocated for implementing projects in other states."

It is up to each state to identify and prioritize its proposed OM&R activities and the proposals are reviewed and approved annually following the process prescribed by the MOA. The states have typically relied on the entities that operate and maintain the project facilities (conservancy districts, ditch companies, associations, etc.) to identify potential projects.

As certain OM&R activities were approved and Reclamation began implementing them, it became apparent that an effort could be made in assisting the State of Colorado in identifying and efficiently implementing potential projects. The primary motivation for this is to attempt to minimize Reclamation's non-contract costs associated with developing and administering the contracts (design and design review, environmental compliance, contract procurement, etc.). For example, Reclamation's non-contract costs could be reduced if all of the activities for a given facility were approved and implemented at once rather than individually. In addition to minimizing non-contract costs, it appears desirable to identify as many potential OM&R activities as possible in order to gage the magnitude of the overall need relative to the funds available.

Based on the above and with the support of the CWCB, Reclamation's Western Colorado Area Office (WCAO) initiated this planning effort with the primary goal of identifying all potential OM&R activities associated with the CRSP facilities in its administrative area.

Planning Process

This planning effort was conducted by WCAO staff and staff from Reclamation's Technical Service Center (TSC) during the period of May 2013 through December 2013. Reclamation worked with the entities associated with the operation and maintenance (O&M) of the project facilities on the planning effort as discussed below.

The first step in the process was to meet with the entities associated with the O&M of the project facilities to discuss potential OM&R activities and conduct site visits. The O&M entities are identified in Table 1 along with the Reclamation facilities they are associated with. The entities involved included those that Reclamation has O&M contracts with, and in some cases, ditch and irrigation companies that coordinate and/or conduct O&M with the entities Reclamation holds contracts with.

Table 1.—Reclamation Facilities Eligible for MOA Funds and Associated O&M Entities

Reclamation Facilities	O&M Entities
Animas-LaPlata Project, CO	Animas-La Plata Operations, Maintenance, and Replacement Association
Bostwick Park Project, CO	Bostwick Park Water Conservancy District and Cimarron Canal and Reservoir Company
Dolores Project, CO	Dolores Water Conservancy District
Florida Project, CO	Florida Water Conservancy District and Florida Mesa Ditch Companies
Paonia Project, CO	North Fork Water Conservancy District and Fire Mountain Canal and Reservoir Company
Silt Project, CO	Silt Water Conservancy District and Farmers Irrigation Company
Smith Fork Project, CO	Crawford Water Conservancy District, Crawford Clipper Ditch Company, Grandview Ditch and Irrigation Company, C Ditch Company and Needlerock Ditch Company
Uncompahgre Project, CO	Uncompahgre Valley Water Users Association

Following the initial meetings and site visits, each of the O&M entities developed prioritized lists of proposed OM&R items and submitted the lists to Reclamation. In some cases the lists included cost estimates and supporting documentation. In other cases, Reclamation worked with the O&M entities to develop conceptual designs and cost estimates. This typically required follow-up meetings and additional site visits.

For this report, the lists were separated into two lists: 1) extraordinary OM&R items, and 2) routine or other OM&R items. The revised lists were shared with the respective O&M entities and the basis for the revisions was discussed with them.

The items in the following report are intended to provide information to the State of Colorado for its consideration in proposing MOA activities. It should be recognized that no items have been, or are intended to appear as they have been, approved by Reclamation prior to submittal by the State of Colorado. The MOA specifies that the states are to identify and prioritize all proposed activities, and that remains the case despite the way in which possible projects are described or listed within this report. Inclusion of a project within this report does not in any way suggest that it is more likely to be approved.

Summary of Findings

The following sections of this report include discussions of proposed OM&R activities and items included in previous years approved proposals. The cost estimates from these discussions are summarized below along with a brief funding discussion.

Proposed Activities and Approved Proposal Cost Estimates

Table 2 provides a summary of the cost estimate totals from the proposed OM&R activities lists discussed in the previous section, as well as the cost estimates from the previously approved proposals submitted by the states. Detailed discussions on all of the amounts shown in Table 2, except for the multiple facilities amount, are provided later in this report. The multiple facilities amount is for an FY 2015 proposal submitted by the CWCB to install three cloud seeding generators in the San Juan Mountains intended to benefit several reservoirs (McPhee, Lake Nighthorse, Navajo, Lemon, and Vallecito).

Table 2.—Summary of Cost Estimates for Proposed Operation, Maintenance and Replacement Activities and Approved Proposals

Facility	Approved Proposals	Proposed Extraordinary OM&R Items	Proposed Other[1] OM&R Items
Animas-La Plata Project	$792,500	$2,500,000	$32,200,000
Bostwick Park Project	$5,000,000	$1,890,000	$0
Dolores Project	$7,418,000	$9,128,448	$0
Florida Project	$9,800,000	$19,717,978	$73,426,000
Paonia Project	$10,000,000	$15,062,000	$169,000
Silt Project	$5,500,000	$4,182,000	$26,000
Smith Fork Project	$6,000,000	$10,356,000	$0
Uncompahgre Project	$19,870,000	$149,851,013	$0
Multiple Facilities	$195,000	$0	$0
TOTALS	$64,575,500	$210,187,439	$105,821,000

1 - Includes routine OM&R, new construction and items that are eligible for other funding

In most cases, the proposed OM&R activities are for items that are in addition to those included in the previously approved proposals. The exceptions to this are where all or part of the approved amount is to be applied to one or more of the proposed items as discussed below.

It is assumed that 50 percent of the previously approved proposal amount for the Silt Project ($2,500,000) is for proposed activities. The entire previously approved proposals amount for the Uncompahgre Project ($4,870,000) is to be applied to the proposed activities.

It should also be noted that the approved proposals amount for the Animas-La Plata Project includes a calculated present value ($335,771) based on the approved annual amount of $17,500 for operation and maintenance of a stream gage during FY 2016 through FY 2025.

As can be seen from Table 2, there is a large overall demand for the MOA funds and there is a broad range in the proposed amounts. Although the amounts are in some cases indicative of the relative size of the respective facilities, some O&M entities were more aggressive in identifying proposed activities than others. While all of the O&M entities were encouraged to identify all potential OM&R activities at this time, it is also understood that additional activities can be identified in the future, by O&M entities and the State.

A cursory economic analyses based on the Table 2 information indicates the overall demand significantly exceeds the MOA revenues available.

Animas-La Plata Project

Reclamation contracts with the Animas-La Plata Operations, Maintenance, and Replacement Association (Association) for operation and maintenance of all Animas-La Plata Project facilities. The Association has submitted three proposals that have been approved for MOA revenues funding to date. The first proposal is for $250,000 of FY2013 funds for a stream gaging station on Basin Creek below Lake Nighthorse. The second proposal is for $350,000 of FY2015 funds to construct a mussel inspection and de-contamination station Lake Nighthorse. The third proposal is for $17,500 in annual funding for operation and maintenance of the Tall Timber gaging station.

Reclamation staff met with the Association's Manager on June 19, 2013 to discuss maintenance items and perform site visits. A prioritized list of additional items proposed for consideration for MOA revenues funding was then submitted by the Association. Many of the items on the list submitted by the Association are either considered by Reclamation to be routine maintenance items or other funding sources are available for certain listed items (Security Program, escrow account, emergency replacement funds, etc.). The submitted list was therefore split into two lists: extraordinary OM&R items and other OM&R items. The extraordinary OM&R items list is shown in Table 3 and other OM&R items (routine OM&R and items with other funding sources) are shown in Table 4. The items from Table 3 are described on the following pages and Table 4 includes brief descriptions of the other OM&R items. All cost estimates consist of an estimated contract cost plus a non-contract costs estimate. The non-contract costs estimates are typically calculated to be 30 percent of the contract estimate. The Association provided all cost estimates.

The extraordinary OM&R cost estimates total shown in Table 3 is $2,500,000. The Table 4 other OM&R cost estimates total is $32,200,000.

Table 3.—Animas-La Plata Project List of Extraordinary OM&R Items

Priority	Item	Contract Cost Estimate	Total Cost Estimate
1	Operation of Mussel Inspection/Decontamination Station	$923,077	$1,200,000
2	Rehabilitate Power Line Road Upstream of Ridges Basin Dam	$307,692	$400,000
3	Additional Embankment Armoring and Reinforcement of Existing Armoring	$461,538	$600,000
4	Pipeline Flow Measurement	$192,308	$250,000
5	Install Asphalt Pavement on Tribute Garden Access Road	$38,462	$50,000
COST ESTIMATE TOTALS		$1,923,077	$2,500,000

Table 4.—Animas-La Plata Project List of Other OM&R Items

Item	Cost Estimate	Notes
Durango Pumping Plant Intake Automated Trash Rake	$1,250,000	Modify existing trash rack with automated rake because of safety concerns. (2015)
Power Line Road Crash Gate	$100,000	Replace existing gate near boat ramp with heavy duty crash gate. (2016)
Annual High Flow Flushing of Basin Creek	$270,000	$30,000 per year. (2016-2024)
Ridges Basin Dam Security Cameras	$150,000	Install functional security cameras since existing cameras are non-functional. (2016)
Connect Power Line Road to Ridges Basin Dam Access Road	$1,500,000	The Power Line Road dead ends approximately 200 feet from the north end of the dam access road and at an elevation approximately 20 feet above the dam access road and significant rock excavation and stabilization will be required. Connecting the roads will minimize travel times for various access needs. (2016)
Seal Durango Pumping Plant Floors	$100,000	Seal/coat all concrete flooring because Association has concerns about stains from spills. (2016)
Durango Pumping Plant Pumps Rehabilitation	$850,000	It is suspected that significant portions of the pump lining material in all pumps has delaminated and possibly resulted in damage to impellors and/or other internal components. (2016-2019)
Seal Coat Project Asphalt	$280,000	Annual contracts at $40,000 per year for 7 years. (2016-2018, 2020-2023)
Project Lands Weed Control	$650,000	Establish a 5 year contract for weed control and management on project lands. (2016)
Annual O&M Expenses	$13,500,000	$1,500,000 per year for 15 years. (2016-2024)
Repair of Concrete to Ridges Basin Inlet Conduit Energy Dissipation Structure	$100,000	Appears damage could have been freeze-thaw, or old patches that fell out, but there is some spalling. It is exacerbated by the turbulent water. Anticipating more damage to occur in the future. (2018 & 2023)

Item	Cost Estimate	Notes
Fire Mitigation on Project Lands	$6,000,000	4 annual contracts at $1,500,000 each. (2017, 2019, 2021 & 2023)
LEED and Guiding Principles Maintenance and Compliance	$300,000	3 annual contracts at $100,000 each. (2017, 2021 & 2024)
Rehabilitate and Maintenance of Basin Creek Drainage Facilities	$500,000	It's anticipated that more grouting of riprap may be required, mucking out the channel in various locations, cattail removal, and tributary drainages improvements. (2018 & 2023 at $250k each)
Pumping Plant Breaker and Bus Maintenance	$300,000	2 annual contracts at $150,000 each. (2018 & 2023)
Upgrade SCADA, Security, and Fire systems computers and software	$200,000	2 annual contracts at $100,000 each. (2019 & 2024)
Ridges Basin Dam Access Road Maintenance	$300,000	Replace road base materials, establish proper drainage, and road grading for the access road to Dam. 2 annual contracts at $150,000 each. (2019 & 2024)
Rehabilitate Cattle Fence Along Basin Creek	$200,000	2 annual contracts at $100,000 each. (2019 & 2024)
Re-coat/Repair Corrosion on Dam Outlet Pipe	$400,000	2 annual contracts at $200,000 each. (2019 & 2024)
Chip Seal Project Asphalt	$100,000	One contract. (2019)
Basin Creek Channel Lining	$2,000,000	Concrete line the Basin Creek Channel from the outlet works of RBD to Drop Structure #1. (2020)
Gates and Valves Extraordinary Maintenance	$3,000,000	Includes Dam Guard Gate, Jet Flow Gate, Sleeve Valve, and Butterfly Valves. (2022)
Inlet Conduit Maintenance	$400,000	Anticipated that by 2023 the cement mortar lining will need significant repairs, and potentially the deflected areas of the pipe may need rehabilitation. (2023)
Buildings Painting	$250,000	Includes Pumping Plant, Equipment Storage Building and the Permanent Operating Facility. (2023)
Rehabilitate Pumps	$850,000	Rehabilitate all eight pumping units in pumping plant. It is suspected that significant portions of the pump lining material in all pumps has delaminated and possibly resulted in damage to impellers and/or other internal components
Overlay Project Asphalt	$300,000	(2024)
COST ESTIMATES TOTAL	$32,200,000	

Item 1 – Operation of Mussel Inspection and Decontamination Station

This item is for the annual operation and maintenance of the planned mussel inspection and decontamination station beginning in FY2016 and continuing through FY2025.

The estimated cost for Item 1 is $1,200,000.

Item 2 – Rehabilitate Power Line Road Upstream of Ridges Basin Dam

There are several low sections in the existing subject roadway that need to be raised and where erosion problems need to be corrected. The total length of 20-feet wide gravel road that needs improvements is approximately 5,000 feet.

The estimated cost for Item 2 is $400,000.

Item 3 – Additional Embankment Armoring and Reinforcement of Existing Armoring

There are several areas of shoreline between the dam and the boat ramp where it appears embankment armoring is needed to control erosion by wave action. As shown in Photograph 1, what appears to be material eroded from the shoreline is accumulating on the boat ramp. If not corrected, it appears further erosion at other areas could result in damage to the Power Line Road.

The estimated cost for Item 3 is $600,000.

Photograph 1.—Lake Nighthorse boat ramp with eroded materials deposition (Animas-La Plata Project).

Item 4 – Pipeline Flow Meter

This item is for purchasing and installing an acoustic Doppler type Flowmeter on the proposed 36-inch diameter pipeline that will extend from the intake tower for the La Plata West Water Authority, Southern Ute Indian Tribe, and Ute Mountain Ute Tribe. The meter will be needed to provide accurate deliveries to the above entities.

The estimated cost for Item 4 is $250,000.

Item 5 – Install Asphalt Pavement on Tribute Garden Access Road

Pavement of the subject road is proposed to improve access to this important site.

The estimated cost for Item 5 is $50,000.

Bostwick Park Project

Reclamation contracts with the Bostwick Park Water Conservancy District (BPWCD) for operation and maintenance of Bostwick Park Project facilities (Silver Jack Dam and Reservoir and Bostwick Lateral and Drains). The BPWCD coordinates with the Cimarron Canal and Reservoir Company (CCRC) on the operation and maintenance of the non-project portion of the delivery system.

The BPWCD has submitted one proposal that has been approved for MOA revenues funding to date. The proposal is for $150,000 of FY2013 funds to automate and provide remote control for the Silver Jack Dam outlet works. Design of these modifications is underway by Reclamation and contract award is anticipated during 2014.

Reclamation staff met with the BPWCD President on May 8, 2013 to discuss extraordinary OM&R items and perform site visits. A prioritized list of additional items proposed for consideration for MOA revenues funding was then developed by the BPWCD and CCRC. Reclamation considers all of the proposed items to be extraordinary OM&R items.

The priority list is shown in Table 5 and each of the items from the table is discussed below. Each of the priority list cost estimates consist of an estimated contract cost plus a non-contract costs estimate. The non-contract costs estimates are calculated to be 30 percent of the contract cost estimate for construction projects and 10 percent for the non-construction (study) contract.

The total estimated cost for all extraordinary OM&R items is $1,890,000.

Table 5.—Bostwick Park Project List of Extraordinary OM&R Items

Priority	Item	Contract Cost Estimate	Total Cost Estimate
1	Replacement of Cimarron Ditch Diversion Structure	$264,000.00	$343,000
2	Installation of Cimarron Ditch Inflow Measurement Structures	$105,000.00	$137,000
3	Reregulation Reservoir Study	$100,000.00	$110,000
4	Implementation of Reregulation Reservoir Study Recommendations	$1,000,000.00	$1,300,000
COST ESTIMATES TOTAL		$1,469,000	$1,890,000

Item 1 – Replacement of Cimarron Ditch Diversion Structure

At the terminus of the Cimarron Ditch, its flow is split into the Hairpin Ditch and the Vernal Mesa Ditch. The existing diversion structure is in poor condition (see Photograph 2) and significant erosion has occurred at the head of the Vernal Mesa ditch due to a lack of adequate energy dissipation features below that portion of the structure (see Photograph 3). The NRCS worked with the BPWCD to design a new diversion structure that includes flow measurement and energy dissipation features. The design was submitted to JUB Engineers, Orem, Utah for review and development of a cost estimate. The construction cost estimate was provided in a September 5, 2013 memorandum from JUB to the BPWCD.

The cost estimate for Item 1 is $343,000 and is based on the engineer's estimate discussed above.

Photograph 2.—Bostwick Park Cimarron Ditch diversion structure.

Photograph 3.—Erosion of Bostwick Park Vernal Mesa Ditch below Cimarron Ditch diversion structure.

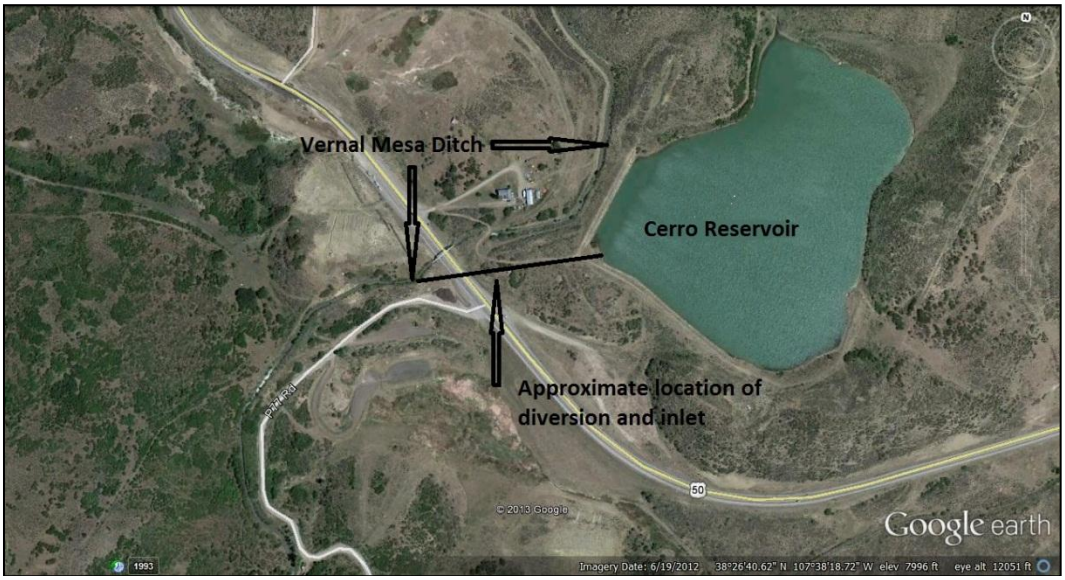
Item 2 – Cimarron Ditch Inflow Measurement Structures

The Cimarron Ditch receives inflows from natural drainage channels at 7 locations. There is currently no means for measuring the quantities of water that enter the ditch as these locations. This item includes installation of prefabricated measurement flumes with automatic water level sensing and data logging features. The BPWCD worked with Reclamation to develop the cost estimate for this item. The estimate assumes a construction cost of $15,000 per site that is comprised of approximately 50 percent each for materials and labor.

Item 3 – Reregulation Reservoir Study

This item would include an evaluation of benefits that could be achieved by incorporating a reregulation reservoir within the existing delivery system. Multiple sites would be evaluated including the existing Cerro Reservoir. This reservoir is now used for domestic water supply purposes and is owned and operated by the Project 7 Water Authority. There is an existing diversion from the Vernal Mesa Ditch to Cerro Reservoir and although the Vernal Mesa Ditch runs along the toe of Cerro Dam there are no means for releasing water from the reservoir into the ditch. The construction of outlet works for such releases and utilizing the impoundment as a reregulation reservoir has been identified as one option to be evaluated, along with the evaluation other sites where dam construction would be required.

The cost estimate for Item 3 is $110,000 and is based on the typical cost for similar studies.



Photograph 4.—Cerro Reservoir and Bostwick Park Vernal Mesa Ditch.

Item 4 – Implementation of Reregulation Reservoir Study Recommendations

This item is for implementation of the recommendations from the Item 3 study. The $1.0M construction cost estimate is a rough "placeholder" since a Cerro Dam outlet works conceptual design has not been developed and other potential reservoir sites have not been evaluated.

The cost estimate for Item 4 is $1,300,000.

Dolores Project

Reclamation contracts with the Dolores Water Conservancy District (DWCD) for operation and maintenance of all Dolores Project facilities, including McPhee Dam and Reservoir and the pressurized irrigation delivery system with its 7 pumping plants.

Much of the information presented below is based on a recent study by the DWCD's engineering consultant (Exponential Engineering Company).[1] The consultant's report includes detailed descriptions of all of the proposed pumping station improvements discussed below.

The DWCD has submitted four proposals that have been approved for MOA revenues funding totaling $4.187M. The first proposal was originally for $1,076,160 of FY2012 funds to rehabilitate the Fairview Pumping Plant, but the amount has been revised to $1,650,000 based on the findings of the above mentioned study and to cover non-contract costs. The other proposals are for FY2015 funding and include: 1) pump motors and controls equipment purchase for upgrading the Pleasant View, Ruin Canyon, Cahone and Dove Creek Pumping Plants ($1,232,000), 2) pumping plant equipment installation at the Pleasant View and Ruin Canyon Pumping Plants ($642,000), and 3) pump rebuilds at the Pleasant View, Ruin Canyon, Cahone and Dove Creek Pumping Plants and purchase of a spare pump ($663,000).

Reclamation staff met with the DWCD's Manager, other DWCD staff, and DWCD's engineering consultant on March 28, 2013 to discuss the status of approved proposals and additional extraordinary OM&R items. A prioritized list of additional items proposed for consideration for MOA revenues funding was subsequently developed by the DWCD.

The DWCD priority list is shown in Table 6 and each of the items from the table is discussed below. Each of the priority list cost estimates consist of an estimated contract cost plus a non-contract cost estimate. The non-contract cost estimates are calculated to be 20 percent of the contract estimate. This percentage is being used rather than 30 percent as for other projects since the DWCD has contracted with its engineering consultant separately for design of all projects.

The DWCD provided the construction cost estimates for all pumping plant related items and these estimates are based on pumping plant rehabilitation conceptual

[1] Pumping Plant Assessment and Capital Improvements Recommendations, DWCD- 1205, March 2013, Exponential Engineering Company, 202 W. North St., Cortez, CO 81321 970-564-9261.

designs by its engineering consultant from the report mentioned above. The specific rehabilitation/replacement items are similar for each of the pumping plants and are described in the report. The rehabilitation/replacement items typically include replacing pump motors and variable speed drives, replacing transformers, rebuilding pumps, and replacing other miscellaneous appurtenances (meters, screens, air compressors, dampers, overhead door motor operators, lighting, etc.). The report discusses the need for replacing/rebuilding the approximately 30-year old pumping systems and other items, and the significant impacts to the delivery system that would result from failure of any of the pumping stations.

The estimated total cost of all extraordinary OM&R items from Table 6 is $9,128,448.

Table 6.—Dolores Project List of Extraordinary OM&R Items

Priority	Item	Contract Cost Estimate	Total Cost Estimate
1	Great Cut Pumping Plant Upgrade	$760,665	$912,798
2	Pumping Plant SCADA Equipment Replacement	$397,750	$477,300
3	Pumping Plant Intake Screens Replacement	$937,583	$1,125,100
4	Pumping Plant Miscellaneous Equipment Replacements & Lighting	$464,750	$557,700
5	Sandstone Pumping Plant Upgrade	$1,400,000	$1,680,000
6	Canal Lining	$2,146,292	$2,575,550
7	McPhee Spillway	$1,500,000	$1,800,000
COST ESTIMATES TOTALS		$6,830,980	$9,128,448

Item 1 – Great Cut Pumping Plant Upgrade

The proposed upgrade of the subject plant is described in detail in the previously mentioned study report. The proposed upgrade items include the following:

- replace five (5) synchronous motor static excitation systems,
- replace five (5) obsolete pressure switches,
- replace two (2) obsolete level switches, and
- repair or replace two (2) valve position indicators.

The total estimated cost for Item 1 is $912,798.

Item 2 – SCADA Equipment for All Pumping Plants

This item is for purchasing SCADA equipment for all pumping plants at once for uniformity. The new equipment will replace the existing programmable logic controllers and Ethernet or fiber optic communications systems are planned. The DWCD will install all equipment and fund engineering design for an estimated $71,600.

The total estimated cost for Item 2 is $477,300.

Item 3 – Pumping Plant Intake Screens Replacement

This item is for purchasing equipment for six pumping plant screen replacements to be installed by the DWCD. The engineering and design cost estimate is $118,800, and this cost will be covered separately by the DWCD.

The total estimated cost for Item 3 is $1,125,100.

Item 4 – Pumping Plants Miscellaneous Equipment and Lighting Replacements

The item is for purchasing miscellaneous equipment for six pumping plants (air compressors, roll-up door motors, damper motors, etc.), and new lighting for three plants. All of the equipment and lighting fixtures will be installed by the DWCD. The engineering and design cost estimate is $64,300, and this cost will be covered separately by the DWCD.

The total estimated cost for Item 4 is $557,700.

Item 5 – Sandstone Pumping Plant Upgrade

The proposed upgrade of the subject plant is described in detail in the previously mentioned study report. The Item 4 miscellaneous equipment does not include this pumping plant. The proposed upgrade items include the following:

- Remove all existing electrical and mechanical equipment in plant building,
- modify sump and piping to utilize two (2) 250Hp vertical turbine pumps,
- install one (1) 480V switchboard,
- install two (2) 250Hp variable frequency drives,
- install 120V transformer and power panel for convenience power,
- modify building shell with hatches to facilitate removing motors and pumps,
- insulate building shell,

- install new HVAC system,
- install one (1) new air compressor for plant service air,
- replace one (1) roll-up door motor operator,
- upgrade lighting, and
- add one (1) daylight drain to main sump.

The total estimated cost for Item 5 is $1,680,000.

Item 6 – Canal Lining

This item is for the installation of combined geotextile and shotcrete canal lining materials in a 5,395 feet section of the Dove Creek Canal. This unlined earthen canal section has relatively high seepage rates compared to other Project canal sections. The unit cost used by Reclamation to estimate the contract cost was based on costs for similar recent Salinity Program canal lining projects.

The total estimated cost for Item 6 is $2,575,550.

Item 7 – McPhee Spillway Concrete Repair

This item includes removing and replacing approximately 370 cubic yards of deteriorated concrete on the floor of the spillway. The deteriorated concrete areas have been surveyed and DWCD plans to work with Reclamation to develop specific plans for removal and replacement methods to be used. The DWCD and staff from Reclamation Cortez, Colorado Field Office cooperated in the development of the contract cost estimate for this item.

The total estimated cost for Item 7 is $1,800,000.

Florida Project

Reclamation contracts with the Florida Water Conservancy District (FWCD) for operation and maintenance of all Florida Project facilities, and the FWCD contracts with the Florida Mesa Ditch Companies for operation and maintenance of the delivery system portion of the project.

The FWCD has submitted four proposals that have been approved for MOA revenues funding totaling $11.745M. The first proposal is for $1.5M of FY2012 funds to line 1.44 miles of canal, the second proposal is for $2.0M of FY2012 funds to replace the regulating gates' seals at Lemon Dam, the third proposal is for $7.9M of FY2015 funds to line 5.2 miles of canals, and the fourth proposal is for $345,000 of FY2015 funds to implement a mussel inspection and decontamination station at Lemon Reservoir. An approximately $1.7M contract was awarded for the FY2012 canal lining in August 2013 and construction is ongoing. The gate seals replacement project is under design and construction is anticipated during 2014.

Reclamation staff met with the FWCD's Damtender and the Florida Farmers Ditch Company (FFDC) Manager on June 20, 2013 and September 17, 2013 to discuss extraordinary OM&R items and perform site visits. A prioritized list of additional items proposed for consideration for MOA revenues funding was then developed by the FWCD and FFDC. Since the list submitted included several items that are not extraordinary type OM&R items, the list was split into two lists: extraordinary OM&R items and routine OM&R and new construction items. The extraordinary OM&R items list is shown in Table 7 and routine OM&R and new construction items are shown in Table 8.

The Table 7 items are discussed below. Each of the priority list cost estimates consist of an estimated contract cost (typically for construction) plus a non-contract costs estimate. The non-contract costs estimates are calculated to be 30 percent of the contract. The FWCD and FFDC provided all cost estimates.

The total estimated cost for all extraordinary OM&R items from Table 7 is $19,717,978.

Table 7.—Florida Project List of Extraordinary OM&R Items

Priority	Description	Contract Cost Estimate	Total Cost Estimate
1	Damtender Residence, Shop and Water System Upgrades	$326,923	$425,000
2	Canal Monitoring and Automation	$569,000	$739,700
3	Outlet Works Flow Meter and Spillway Inlet Waterway Barrier	$111,538	$145,000
4	Canals and Laterals Piping	$8,078,400	$10,501,920
5	Mussel Inspection and Decontamination Station Operation	$263,308	$342,300
6	Farmers West Canal Lining	$1,757,185	$2,284,340
7	Dam Access Road Crash Gates	$153,846	$200,000
8	Replace High Pressure Gate Hydraulics	$100,000	$130,000
9	Reservoir Ditch Lining	$3,555,552	$4,622,218
10	Comprehensive System Study	$175,000	$227,500
11	SnoTel Sites	$76,923	$100,000
COST ESTIMATES TOTAL		$15,167,675	$19,717,978

Table 8.—Florida Project Routine Maintenance and New Construction Items

Item Description	Cost Estimate
Top of Dam Road Maintenance	$32,500
Wildfire Mitigation	$195,000
Dam Concrete Repair	$201,500
Install Dam Rip Rap	$97,000
Dam Enlargement	$72,900,000
COST ESTIMATES TOTAL	$73,426,000

Item 1 – Damtender Residence, Shop and Water System Upgrades

The Damtender residence, shop and water system are over 50 years old and each are in varying degrees of deteriorated condition. Proposed improvements include new galvanized metal roofing, wood log siding, energy efficient windows and

doors, concrete sidewalk, floor coverings, kitchen and bathroom cabinets and fixtures, and water line. The most critical items appear to be the water line and windows and doors.

The length of existing water line is approximately 700 feet and it is 1.25-inch diameter galvanized metal pipe. It extends from a well located about 200 feet in elevation below the residence. The pipe is in poor condition and numerous sections have been replaced due to leakage. A section of the pipe that was recently removed is shown in Photograph 5.

Photograph 6 is of the Damtender residence showing the poor condition of the log siding and a typical single-pane sliding window. The roof on the residence and shop consists of corrugated metal on top of the original cedar shake material. The shop is shown in Photograph 7.

Since the Damtender residence and shop building are over 50 years old, National Historical Preservation Act requirements would need to be met before modifications to the structures could be made.

The cost estimate for Item 3 is $425,000.

Photograph 5.—Segment of recently removed water line at Florida Project's Lemon Dam Damtender residence.

Photograph 6.—Lemon Dam Damtender Residence.

Photograph 7.—Lemon Dam Damtender Shop.

Item 2 – Canal Monitoring and Automation

This item includes installation of 14 automated gates, 4 automated check structures, 9 automated monitoring stations, and a computer server to store data for all automated gates of the Florida Project distribution system. Automation of diversions to main laterals will reduce waste and reduce operation expenses for the FWCD and FFDC.

Automated gates would be installed on East Lateral, Oversteg Lateral, Picolli Lateral, Kelly Lateral, Thistle Pond Pipeline, Dowler Lateral, Hess Lateral, Mason Lateral, Mason Lateral A, Mason Laterals B and C, Pine Lateral II, Cedar Lateral, Fassett Pipeline, and Florida Canal West. Automated check structures would be installed on the West Lateral, Reservoir Ditch, Kelly Lateral and Dustin Lateral. Automated monitoring stations would be installed on the ends of the Griffith Lateral, Oversteg Lateral, Mason Lateral, Pine II Lateral, Cedar Lateral, Fassett Lateral, FC West Lateral, Piccoli Lateral and Kelly Lateral.

The estimated cost of Item 4 is $739,700.

Item 3 – Outlet Works Flow Meter and Spillway Inlet Waterway Barrier

This item includes purchasing and installing an acoustic Doppler type flowmeter in the nine foot modified horseshoe discharge tunnel and an waterway barrier system across the inlet to the spillway at Lemon Dam. The discharge tunnel receives flows from the two regulating gates and the hydroelectric/bypass line.

The only existing means for measuring the total flow from the discharge tunnel is the gaging station located in the river channel immediately below the dam that is operated by the State of Colorado. Regulating gates flow rates are calculated based on reservoir elevation and gate opening and these values do not compare well with the gaging station data. More specifically, the gaging station data are consistently about 10 percent lower than the gate opening based values; hence the desire for better measurements.

A large forest fire occurred at Lemon Reservoir in 2002 and debris deposition into the reservoir remains a large concern. A water barrier system was installed after the fire to protect the spillway from debris that could impede flows and the condition of the barrier has deteriorated (see Photograph 8).

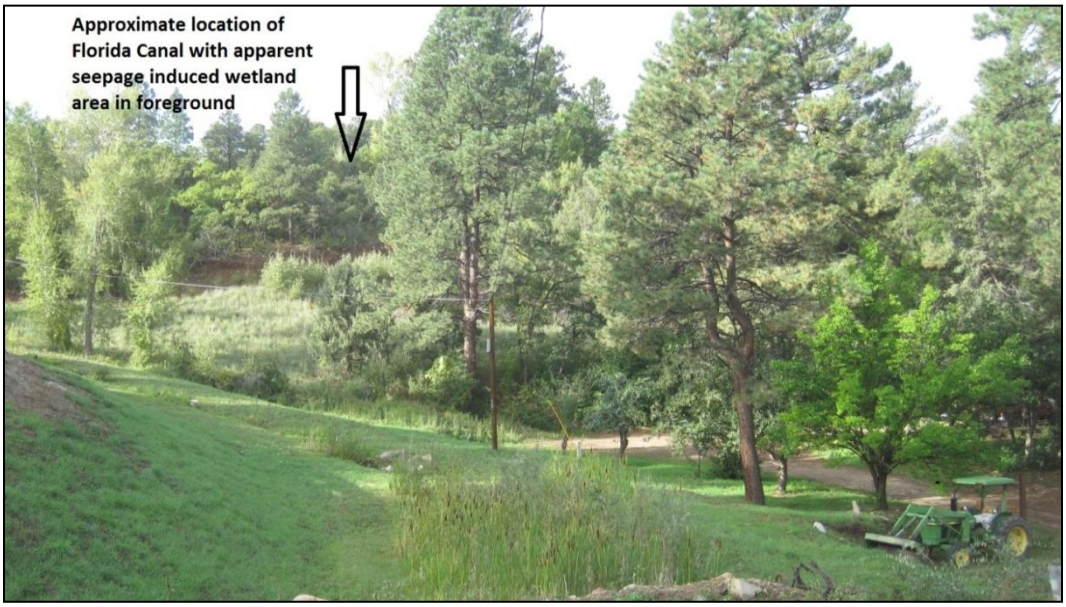
The estimated cost for Item 5 is $145,000.

Photograph 8.—Lemon Dam Spillway water barrier.

Item 4 – Canal Piping

This item includes piping the 6.8 mile section of the Florida Canal from the Florida Canal headgate to Squaw Apple Road. This canal section was also evaluated under the previously cited loss study and the amount of seepage is estimated at 2,485 AFY. There are several wetland areas that could be affected by eliminating the canal seepage (see Photograph 9) and mitigation or other requirements may be necessary for NEPA compliance.

The cost estimate for Item 8 is $10,501,920.



Photograph 9.—Wetland area below Florida Project Florida Canal.

Item 5 – Mussel inspection and Decontamination Station Operation

This item is to fund costs of personnel and maintenance for five years of the aquatic nuisance species watercraft inspection station.

The cost estimate for Item 10 is $342,300.

Item 6 – Canal Lining

This item is for lining the approximately 1.6 mile section of the Florida Farmers West Canal from U.S. Highway 160 to the reach below Grandview. This canal section was also evaluated under the previously cited loss study and the amount of seepage is estimated at 767 AFY.

The cost estimate for Item 11 is $2,284,340.

Item 7 – Dam Access Road Rated Barrier Gates

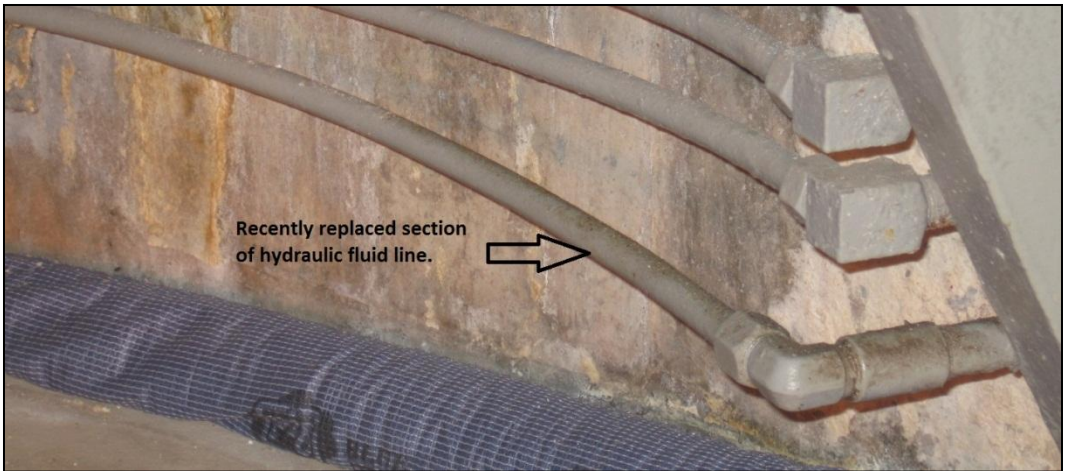
This item is to install rated barrier gates on the east side of the dam crest and on the access road west of the shaft house at the dam to improve security.

The cost estimate for Item 12 is $200,000.

Item 8 – Replace High Pressure Gate Hydraulic Fluid Lines

The original hydraulic fluid lines are prone to leakage and repairs can include draining, refilling and flushing the system. A section of recently repaired line is shown in Photograph 10.

The cost estimate for Item 13 is $130,000.



Photograph 10.—Lemon Dam Florida Project High Pressure Gate hydraulic fluid lines.

Item 9 – Canal Lining

This item is to line the approximately 2.6 mile section of the Reservoir ditch south of Pastorius Reservoir. This canal section was not evaluated under the previously cited loss study but the FFDC estimates seepage to be about 3,000 AFY.

The cost estimate for Item 14 is $4,622,218.

Item 10 – Comprehensive Delivery System Study

This item is for a comprehensive evaluation and associated report on the operation, infrastructure, etc. of the dam and delivery system.

The cost estimate for Item 16 is $227,500.

Item 11 – SnoTel Sites

This item includes contracting with the NRCS for installation and operation and maintenance (5 years) for two new SnoTel sites in the Lemon Reservoir drainage basin.

The cost estimate for Item 17 is $100,000.

Paonia Project

Reclamation contracts with the North Fork Water Conservancy District (NFWCD) for operation and maintenance of all Paonia Project facilities, and the NFWCD has delegated its operation and maintenance responsibilities under contract with the Fire Mountain Canal and Reservoir Company (FMCRC).

The NFWCD has submitted one proposal that has been approved for MOA revenues funding. The proposal is for $300,000 of FY2013 funds to conduct a sedimentation study that will identify alternatives to maintain or prolong the storage capacity of Paonia Reservoir. Reclamation's TSC is conducting the study which is scheduled for completion in 2014.

Reclamation staff met with the FMCRC Superintendent on May 10, 2013 and August 20, 2013 to discuss extraordinary OM&R items and perform site visits. Reclamation staff also participated in an August 8, 2013 teleconference that was attended by representatives of NFWCD and FMCRC. The meeting resulted in a draft prioritized list of additional items to be proposed for consideration for MOA revenues funding. The priority list was subsequently approved by NFWCD and FMCRC.

Upon review of the priority list, Reclamation identified two items that are considered routine rather than extraordinary OM&R: 1) spillway and siphon inlet repairs ($59,000) and 2) vegetation and burrowing animal control program ($110,000).

The list of extraordinary OM&R items shown in Table 9 is a revised version the priority list from NFWCD and FMCRC. Each of the items from the table is discussed below. The priority list cost estimates consist of an estimated contract cost plus a non-contract cost estimate. The non-contract cost estimates are calculated to be 30 percent of the contract cost estimate for construction projects and 10 percent for studies.

The total for all cost estimates from Table 9 is $15,062,000.

Table 9.—Paonia Project List of Extraordinary OM&R Items

Priority	Item	Contract Cost Estimate	Total Cost Estimate
1	Dam Elevator Repairs	$78,000	$101,000
2	Dam Outlet Works Modifications and Inlet Repairs	$6,000,000	$7,800,000
3	Fire Mountain Canal Safety Improvements	$3,214,000	$4,178,000
4	Replace Fire Mountain Canal Diversion Structure	$2,210,000	$2,873,000
5	Planning Study on Long-term Delivery System Improvements	$100,000	$110,000
6	Implementation of Delivery System Optimization Components from Long-Term Study	$450,000	$585,000
COST ESTIMATE TOTALS		$11,602,000	$15,062,000

Item 1 – Dam Elevator Shaft Repairs

This item includes repairs to the elevator shaft concrete walls and replacement of corroded metal components within the shaft per Reclamation O&M recommendation 2010-2-A. The concrete repairs include treating cracks in the walls to reduce moisture intrusion that is causing excessive corrosion on the metal elevator guides and access ladder. The contract cost estimate for the concrete repairs is $28,000 and the contract cost estimate for replacement of the guides and ladder is $50,000 (both provided by NFWCD. Photograph 11 shows a sample of the metal corrosion.

The cost estimate for Item 1 is $101,400.

Photograph 11.—Paonia Dam Elevator Shaft Metal Corrosion.

Item 2 – Dam Outlet Works Modifications and Inlet Repairs

This item includes modification of the outlet works to provide sluicing of sediments, improve flow conditions at low reservoir elevations, and repair of damage to the outlet works inlet concrete bulkhead.

Reclamation's Standing Operating Procedures for Paonia Dam document discusses that operation of the outlet works is to be avoided at low reservoir elevations due to adverse hydraulic conditions that occur. These conditions result as a vortex forms over the inlet and air becomes entrained within the conduit resulting in an extreme pressure "blowback" that is suspected of causing structural damage. There is existing damage to the inlet structure and its bulkhead as documented in Reclamation's 2013 Paonia Dam Periodic Facility Review Report and an October 12, 2012 Travel Report memorandum. Photograph 12 is from the latter document and shows the damage to the bulkhead. It is assumed this damage was caused by the blowback and similar damage occurred during the inaugural testing of the outlet works. There are also concerns that the air entrainment could cause cavitation damage in sections of the outlet conduit that have not been inspected for many years.

It has been proposed that incorporating a new ventilation system could reduce or eliminate the blowback condition and cavitation potential. This proposal was developed for FMCRC and NFWCD by an engineering consultant and it has not been reviewed by Reclamation. The consultants construction cost estimate for this proposal was $64,500 and is based on a preliminary conceptual design and hydraulic calculations as documented in recent memorandums.[2] The consultants also developed a conceptual design for modification of the existing outlet works to provide a low level inlet that could allow for sluicing of sediments from the reservoir.

The outlet works inlet and bulkhead was inspected by staff from Reclamation's Materials Engineering and Research Laboratory in November 2013. Based on this inspection, the estimated contract cost for repairs and the ventilation modification discussed above is $5,000,000. Based on the consultants cost estimate, it is assumed the low level inlet modification could be done at the same time for an additional $1,000,000.

The cost estimate for Item 2 is $7,800,000.

[2] The ventilation concept description and cost estimate are from an October 17, 2013 memorandum by Bruce Marvin, Western Engineers, Inc., Grand Junction, Colorado and the associated hydraulic calculations are from an October 17, 2013 memorandum by Henry Falvey, Dr. Ing., Henry T. Falvey & Associates, Inc.

Photograph 12.—Paonia Dam Outlet Works Inlet and Bulkhead Damage.

Item 3 – Fire Mountain Canal Safety Improvements

This item includes improvements to a critical section of the Fire Mountain Canal and installation of canal measurement, monitoring, and automated wasteway operation improvements in the critical section and at other locations in the upper portion of the canal.

FMCRC staff report there have been numerous failures of the Fire Mountain Canal over the years that resulted in significant property damage and Reclamation's Canal Safety Program has investigated safety related issues at various locations on the canal.[3] One of the most problematic sections of the canal is located just above Terror Creek along Garvin Mesa (see Photographs 13 and 14) where there are multiple active landslide areas and rockfall zones.
A geotechnical engineer from Reclamation's TSC inspected the above canal section on August 22, 2013. A conceptual design was developed based on the findings of the inspection that includes slope stabilization components and canal

[3] The canal was inspected under Reclamation's Canal Safety Program in 2010 and a series of reports of findings were produced in 2011.

improvements. Significant specific components include pipe placement and canal lining, underdrain improvements, lining of upstream ponds and drainage improvements, landslide excavation, ground and slope anchors, and access road improvements. The contract cost estimate for the recommended slope stabilization and canal improvements is $2,864,000.

The proposed monitoring and automation improvements include automation of six wasteways and three diversion structures, monitoring of canal levels at multiple locations, and associated SCADA hardware and software. The contract cost estimate for these improvements, as reported by a consultant representing Rubicon Water, is $350,000 (Zach Thodes personal communication, August 8, 2013).

The cost estimate for Item 3 is $4,178,000.

Photograph 13.—Paonia Project Fire Mountain Canal Section above Terror Creek (note debris along access road recently removed from canal).

Photograph 14.—Paonia Project Fire Mountain Canal above Terror Creek.

Item 4 – Replacement of Fire Mountain Canal Diversion Structure

There a several deficiencies associated with the diversion gate structure and low head diversion dam shown in Photograph 15. The configuration of the gate structure relative to the waterway results in excessive debris accumulation on the trash rack and sediment transport into the canal. The diversion dam, constructed of loose boulders and timbers, is a hazard to river users and inhibits fish passage.

An engineering consultant has developed conceptual designs for two replacement alternatives, and the reported contract cost estimate for the recommended alternative is $1,600,000.4 The contract cost estimate for a telemetry system for remote monitoring and operation of the proposed new gate structure, as reported by a consultant representing Rubicon Water, is $100,000 (Zach Thodes personal communication, August 8, 2013).

The cost estimate for Item 4 is $2,873,000.

[4] Conceptual designs and cost estimates are included in an April 17, 2013 McLaughlin Whitewater Design Group memorandum.

Item 5 – Planning Study on Long-term Delivery System Improvements

The proposed study would include a comprehensive evaluation of long-term future improvements that would allow for efficient demand management of the delivery system to include lining and piping all 27 miles of the Fire Mountain Canal and certain laterals, measurement improvements, expanded remote monitoring/control/automation, vegetation control, etc. The study results would provide a road map for phased implementation of system improvements to plan for funding and best utilize resources.

The cost estimate for Item 5 is $110,000.

Photograph 15.—Paonia Project Fire Mountain Canal Diversion Structure.

Item 6 – Implementation of Delivery System Optimization Components Recommended by Long-Term Delivery System Improvements Study

This item includes previously identified improvements to provide full automation of the Fire Mountain Canal. Specific components include automation of check structures, remote monitoring and control of other structures, and installation of an onsite SCADA system. The contract cost estimate for these improvements, as reported by a consultant representing Rubicon Water, is $450,000 (Zach Thodes personal communication, August 8, 2013).

The cost estimate for Item 6 is $585,100.

Silt Project

Reclamation contracts with the Silt Water Conservancy District (SWCD) for operation and maintenance of Silt Project facilities. The SWCD coordinates with the Farmers Irrigation Company (FIC) on the operation and maintenance of the non-project portion of the delivery system.

The SWCD has submitted several requests via the CRWCD and the State of Colorado that have been approved by Reclamation to utilize MOA revenues to implement project improvements. Specifically, proposals for $2.5M of FY2014 funds and $3.0M of FY 2015 for pumping plant upgrades and water conveyance efficiency improvements have been authorized by Reclamation. To date, design and engineering specifications have not been prepared for any of the projects described in this report and therefore, the estimated costs that are depicted herein are subject to significant uncertainty.

It is important to note that the needs associated with the high priority Pumping Plant modification options are currently being investigated and developed; therefore no specific cost estimates or associated priorities are included in this report. However, it is recognized that such pumping plant upgrades will require significant financial resources due to the complexities and needs related to power transmission, transformation, and control above and beyond the needs associated with pump and motor replacement.

During the formulation of this report, Reclamation staff met with the SWCD Manager and various board members on multiple occasions to discuss needs, desires and extraordinary OM&R items and to perform site visits. A prioritized list of additional items proposed for consideration for MOA revenues funding was then developed and it is included as Table 1. Reclamation considers all but one of the proposed items to be extraordinary OM&R items. The proposed inspection and rehabilitation of Rifle Gap Dam auxiliary equipment ($26,000 estimated cost) is considered to be routine maintenance by Reclamation and therefore it is not included in this report. Each of the items from Table 1 is discussed below.

The reconnaissance level cost estimates included in Table 10 consist of an estimated contract cost plus an assigned non-contract costs estimate. The non-contract costs estimates are calculated to be 30 percent of the contract cost. Reclamation collaborated with SWCD to develop the conceptual designs and contract cost estimates as discussed for each item. In most cases the unit prices used to develop contract cost estimates were based on recent Reclamation Salinity Program project costs and contingency factors were applied as appropriate. The total estimated cost for all proposed items in Table (exclusive of the Silt Pumping Plant upgrades) is $4,182,000.

Table 10.—Silt Project List of Extraordinary OM&R Items

Priority	Description	Contract Cost Estimate	Total Cost Estimate
1	Grass Valley Canal Improvements	$544,000	$707,000*
2	Replace Grass Valley Canal Siphon #2	$244,000	$317,000
3	Silt Pump Canal Pipe Installation	$229,000	$298,000
4	Replace Grass Valley Canal Siphon #3 Drain	$25,000	$33,000
5	Inspect Silt Pump Canal Siphons and Rehabilitate Drains	$57,000	$74,000
6	Davie Ditch Pipe Installation	$663,000	$862,000
7	East and West Laterals' Seepage Reduction	$244,000	$317,000
8	Dry Elk Valley Lateral Lining	$1,061,000	$1,379,000
9	Replace Office/shop	$150,000	$195,000
COST ESTIMATE TOTALS		$3,217,000	$4,182,000

* The SWCD has reportedly expressed concerns that this estimate may be low.

Item 1 – Grass Valley Canal Improvements

In the upper portion of the Grass Valley Canal immediately upstream and downstream of the second tunnel, the canal is on an extremely steep and unstable terrain. There is approximately 400 feet of enclosed conveyance upstream of the tunnel that is in various states of disrepair as shown in Photograph 16. The canal flows toward the enclosed conveyance section in a concrete-lined channel and the enclosed section begins with what appears to be corrugated metal pipe after which the canal top is bridged by either thin steel plates supported by I-beams or angle iron or reinforced concrete slabs. The downstream canal section is unlined open channel and the 300 feet section adjacent to the tunnel is very difficult to access and prone to rockfall.

A geotechnical engineer from Reclamation's TSC inspected the above canal sections on August 23, 2013. A conceptual design was developed based on the findings of the inspection that includes slope and tunnel portal stabilization components and pipe placement to reduce the potential for canal failure due to rockfall. The conceptual design includes replacing the upstream covered section with 48-inch diameter pipe and placing the same downstream of the tunnel. Also included is rock scaling, rock bolt placement, shotcrete placement, and access road improvements.

Additionally, Silt WCD management and staff agreed that because the Grass Valley Canal provides water the majority of their service area and conveys project water to Harvey Gap, a critical storage reservoir, it should receive top priority and immediate attention. Any service disruption related to the Grass Valley Canal would be devastating to the Silt WCD and their members.

The cost estimate for Item 1 is $707,000. (It should be noted that the Silt WCD believes this estimate may be too low and that additional significant financial resources may be required to fulfill this number one priority.)

Photograph 16.—Silt Project Grass Valley Canal Cover Upstream of Tunnel 2.

Item 2 – Replace Grass Valley Canal Siphon No. 2

The Grass Valley Canal Siphon No. 2, constructed in the 1930s, includes approximately 180 feet of 42-inch diameter welded steel pipe and inlet and outlet structures constructed of concrete and mortar block. The pipe is located on-grade except at the bottom of the drainage where it's elevated on steel supports approximately 7-feet above above grade. There is evidence of leakage from either the pipe or the pipe and outlet structure interface and both the inlet and outlet structures are in poor condition (see Photographs 17 and 18). The pipe wall thickness was tested by Reclamation's TSC on September 12, 2013 and the lowest reading taken was 0.115-inches and the pipe is considered to be in satisfactory condition.

The structure replacement conceptual design includes removing the existing pipe and appurtenant structures and replacing the pipe with buried 42-inch HDPE pipe and the inlet and outlet structures would be replaced with reinforced concrete structures similar to existing.

The cost estimate for Item 2 is $317,000.

Photograph 17.—Silt Project Grass Valley Canal Siphon 2 Inlet Structure Downstream Exterior Wall.

Photograph 18.—Silt Project Grass Valley Siphon 2 Outlet Structure.

Item 3 – Silt Pump Canal Pipe Installation

The uppermost 1,320 feet section of the Silt Pump Canal is an unlined open channel and experiences significant seepage losses. Photograph 19 shows canal seepage ponding below the canal and vegetation supported by seepage.

The conceptual design for this project includes placing 1,320 feet of 30-inch diameter pipe to be connected to the existing 30-inch pressurized pipe from the pumping plant.

The cost estimate for Item 4 is $298,000.

Photograph 19 – Pump Canal Seepage

Item 4 – Replace Grass Valley Canal Siphon No.3 Drain

The configuration of the existing drain is such that a pump must be used to remove all water from the siphon. Also, it is known that there are large rocks in the bottom of the siphon reducing flow capacity. The SWCD wishes to remove and replace the drain with a combined drain/access feature that would allow nearly full evacuation by gravity and allow for removal of the large rocks. Reclamation collaborated with the SWCD on a conceptual design that would provide the drain and access needs.

The cost estimate for Item 5 is $33,000.

Item 5 – Inspect Silt Pump Canal Siphons and Rehabilitate Drains

There is an outstanding Reclamation O&M recommendation (2006-2-B) to rehabilitate the drains on all several of the siphons on the Silt Project. Five of the seven drains on the Silt Pump Canal are in very poor condition and three of these either leak or groundwater is seeping into the vaults.

The conceptual design for this project includes pumping five of the Silt Pump Canal siphons dry, inspecting the siphons with remote control cameras, rebuilding and recoating the valves, and sealing the vaults.

The cost estimate for Item 6 is $74,000.

Item 6 – Davie Ditch Pipe Installation

The Davie Ditch begins at the portal of the 32-inch diameter pressure pipe that extends approximately one mile from the Rifle Gap Dam outlet works. The unlined open channel upper sections of the canal experience significant seepage losses. Approximately 2,000 feet of pipe (2 sections) have been placed in the recent past to reduce seepage. Photograph 20 shows significant vegetation being supported by Davie Ditch seepage in the area proposed for piping.

The conceptual design for this proposed project includes removing the sections of existing gravity flow pipe (2,000 feet) and placing 3,110 feet of 30-inch pipe that would convey pressurized flow from the existing portal to Siphon No.1. Also, 790 feet of 36-inch diameter pipe would be placed immediately downstream of the siphon that would flow by gravity.

The cost estimate for Item 3 is $862,000.

Photograph 20.—Silt Project Vegetation below Davie Ditch.

Item 7 – East and West Laterals Seepage Reduction

The SWCD has identified two sections on the East Lateral and three section on the West Lateral where this is excessive seepage from the unlined open channels. The total length for these five sections is 3,220 feet. The conceptual design for this project includes installation of geotextile/schotcrete lining in four section and replacing the fifth section with 30-inch diameter pipe.

The cost estimate for Item 8 is $317,000.

Item 8 – Dry Elk Valley Lateral Lining

The Dry Elk Valley Lateral experiences significant seepage losses and the SWCD proposes lining the entire lateral (9,500 feet). The conceptual design for the lining includes a geotextile and shotcrete liner.

The cost estimate for Item 7 is $1,379,000.

Item 9 – Replace Office/Shop

The SWCD proposes demolition of the existing office/shop structure (see Photograph 21) and replacing it with a slightly larger (2,000 square feet) structure.

The cost estimate for Item 9 is $195,000.

Photograph 21.—Silt Project SWCD Office and Shop.

Smith Fork Project

Reclamation contracts with the Crawford Water Conservancy District (CWCD) for operation and maintenance of Smith Fork Project facilities. The CWCD coordinates its operations with those of the Crawford Clipper Ditch Company (CCDC), Grandview Ditch and Irrigation Company (GDIC), and Needlerock Ditch Company (NDC); all of which divert water from Smith Fork Creek.

The CWCD has submitted one proposal that has been approved for MOA revenues funding to date. The proposal is for $800,000 of FY2013 funds for canal lining and piping projects. The proposal identified several small projects, but it has since been decided that larger comprehensive projects should be considered instead.

Reclamation staff met with the CWCD Manager, certain board members, its engineering consultant and representatives of CCDC, GDIC, and NDC on May 9, 2013 to discuss extraordinary OM&R items and perform site visits. (Site visits were limited due to wet conditions; hence the absence of photographs in this section.) A second meeting was held by the same group on August 20, 2013 that was also attended by a representative of URS Corporation to discuss the URS Lower Gunnison Salinity Control Study. During this meeting discussions centered on developing a master plan to improve the overall efficiency of all entities' operations and how CRSP MOA funded projects could fit into the plan. The master plan concept is discussed further under the Item 5 below.

Following these meetings, a prioritized list of additional items proposed for consideration for MOA revenues funding was developed by the CWCD and submitted to Reclamation. Reclamation considers all of the proposed items to be extraordinary OM&R items.

Table 11 includes the priority list submitted with associated cost estimates. Each of the items from the table is discussed below. The discussions describe the conceptual designs and associated cost estimates.

The Table 11 cost estimates consist of an estimated contract cost plus a non-contract costs estimate. The non-contract costs estimates are calculated to be 30 percent of the contract cost for construction items and 10 percent for the proposed study. Reclamation collaborated with CWCD to develop the conceptual designs and contract cost estimates as discussed for each item. In most cases the unit prices used to develop contract cost estimates were based on recent Reclamation Salinity Program project costs and contingency factors were applied as appropriate.

The total estimated cost for all proposed items from Table 11 is $10,356,000.

Item 1 – Aspen Canal Piping

This item includes replacing all open channel sections of the Aspen Canal with pipe, and removing and replacing the existing piped section because of problems with the existing pipe. The CWCD's 2009 Water Management Plan discusses the canal's high seepage losses and the problems with the existing pipe (settlement and damage due to shallow bury). A typical high seepage area supporting vegetation growth below the canal is shown in Photograph 22. While the worst seepage areas are located in the northern downstream portion of the canal, the southern and most upstream portion of the canal is through a cut section with very low gradient and resulting high seepage and operational problems.

The CWCD's engineering consultant provided pipe conceptual design information and pipe unit cost estimates based on recent Salinity Program projects were applied. Cost estimates for ditch rehabilitation/seeding and unlisted items were also included.

The estimated cost for Item 1 is $4,008,000.

Table 11.—Smith Fork Project List of Extraordinary OM&R Items

Priority	Description	Contract Cost Estimate	Total Cost Estimate
1	Aspen Canal Piping	$3,083,000	$4,008,000
2	Dam Outlet Works Improvements	$187,000	$243,000
3	Increase Capacity of Feeder Canal Siphon	$445,000	$579,000
4	Reservoir Inflow Measurement and Telemetry	$160,000	$208,000
5	Daisy/Feeder Canal Capacity Increase Study	$100,000	$110,000
6	Implement Daisy/Feeder Canal Capacity Increase Study Recommendations	$4,006,000	$5,208,000
COST ESTIMATE TOTALS		$7,981,000	$10,356,000

Photograph 22.—Smith Fork Project Aspen Canal Seepage Area.

Item 2 – Dam Outlet Works Improvements

Reclamation O&M recommendation 2010-2-G (establish a program to annually document damage to regulating gates caused by low flow operation) was initially addressed through an April 11, 2012 inspection and associated May 17, 2012 travel report. The inspection confirmed damage to the gates that has apparently resulted from releasing flows less than recommended.

The CWCD releases relatively low flows from the reservoir (less than 5 cfs) during the non-irrigation season to meet stock watering needs. At the small gate openings associated with these flow rates, velocities are such that cavitation damage appears to be occurring. The cavitation damage prevents the gates from sealing properly causing leakage when closed.

Based on the above, the CWCD proposes that the damage to the gates be repaired and that a low flow bypass be installed so that water can be released during the non-irrigation season without causing further damage to the gates. The low flow conceptual design includes connection of a 12-inch diameter bypass pipe, removing existing concrete encasement to expose the existing 32-inch diameter pipe, removal of a section of the existing pipe, concrete encasement of new pipe, and a 12-inch butterfly valve and manhole access.

The estimated cost for Item 2 is $243,000.

Item 3 – Increase Capacity of Feeder Canal Siphon

The original construction of the subject siphon consisted of a 36-inch diameter reinforced concrete pipe. A second 24-inch diameter steel pipe was later added to in an attempt to increase the capacity of the siphon to match channel capacity, but additional capacity is still needed. The siphon outlet structure is shown in Photograph 23. Since construction drawings (517-D-121) indicate the channel capacity above and below the siphon is 60 cfs, it is assumed this is the approximate capacity of the siphon. The CWCD proposes to increase the siphon capacity by 40 to 50 cfs in order to meet current demands and allow for the planned channel capacity increase discussed below under Item 5.

Based on the above, the conceptual design for the siphon modification includes removing the existing pipes and inlet/outlet structures, and installing two 48-inch diameter pipes and new inlet/outlet structures. However, vertical re-alignment to lower the siphon outlet and reduce pipe diameters should be evaluated during final design.

The estimated cost for Item 3 is $579,000.

Photograph 23.—Smith Fork Project Feeder Canal Siphon Outlet.

Item 4 – Reservoir Inflow Measurement and Telemetry

This item includes installation of flow measurement features to allow the CWCD to monitor total inflow to Crawford Reservoir in real time. The need for better flow measurement is associated with improving water administration as discussed in the CWCD 2009 Water Management Plan.

The conceptual designs for this item includes installation of a long-throated flume at the bottom of the Feeder Canal and either the same or a stream gaging station on Iron Creek. For Clear Creek and Mud Creek, it is assumed small prefabricated parshall flumes could be placed in the channels above the reservoir high water level. Each measurement feature would include telemetry equipment so that flows could be monitored from the CWCD Office.

The estimated cost of Item 4 is $208,000.

Item 5 – Daisy/Feeder Canal Capacity Increase Study

The CWCD, CCDC, GDIC, and NDC are interested in working together to develop a master plan for improving the efficiencies of their systems in order to conserve water and reduce salt transport. One of the options to be considered under the master plan includes diverting more water into Crawford Reservoir via the Daisy/Feeder Canal. This could allow for abandonment of one of the other Smith Fork Creek diversions thus reducing associated conveyance losses. A typical section of the Daisy/Feeder Canal is shown in Photograph 24.

This item is for a study to evaluate options for increasing the existing canal system capacity. Alternatives would include one or more capacity increases and different methods to achieve the increase(s). Examples of different methods include enlarging the earthen channel, reshaping and/or enlarging and lining the channel, and replacing the channel with pipe.

The estimated cost for Item 5 is $110,000.

Photograph 24.—Smith Fork Project Daisy/Feeder Canal Typical Section.

Item 6 – Implement Daisy/Feeder Canal Capacity Increase Study Recommendations

Until the Item 5 study is completed, an interim place holder cost estimate is desired for planning purposes. The cost estimate below is based on an assumed reshaping/enlarging and lining of the canal. The reshaped channel would have a slightly larger bottom with steeper side wall slopes, and the channel would be lined with a combined geotextile and shotcrete liner. The cost estimate is based on unit costs for recent Salinity Program canal lining projects.

The estimated cost of Item 6 is $5,208,000.

Uncompahgre Project

Reclamation contracts with the Uncompahgre Valley Water Users Association (UVWUA) for operation and maintenance of all Uncompahgre Project facilities. The UVWUA recently received funding from the State of Colorado through the Colorado River Water Conservation District (River District) for an Integrated Assessment, Comprehensive Implementation Planning, and System Optimization Analysis. The River District contracted with the Irrigation Training and Research Center (ITRC) at California Polytechnic State University, San Luis Obispo, California to perform the study. The ITRC study is in its late stages and a preliminary draft report of findings was available for this report.

The UVWUA has submitted two proposals that have been approved for MOA revenues funding totaling $4.87M. The first proposal was for $3.0M of FY2012 funds and the second was for $1.87M of FY2014 funds. Both proposals are to support Reclamation's Gunnison Basin Selenium Management Program and water conservation activities. The ITRC study identifies specific projects for addressing the selenium management and water conservation goals. The preliminary draft report of findings includes detailed descriptions of the proposed projects, cost estimates, and a prioritized implementation plan. Reclamation assumes the ITRC report draft is available to audience for this report.
Brief descriptions of each of the proposed extraordinary OM&R and water efficiency improvement projects identified by ITRC are presented below and summarized in Table 12. Since the latest report draft was released, Reclamation has been notified that the prioritization of the projects will be revised in a future draft.

It is emphasized that the conceptual designs, cost estimates, and prioritizations presented herein are subject to change.

The extraordinary OM&R projects' cost estimates consist of the construction contract estimate developed by ITRC and the non-contract cost that is assumed to be 20 percent of the contract cost. This percentage is being used rather than 30 percent as for other projects since engineering, design, and project management costs are included in the ITRC estimates.

The total estimated cost for all extraordinary OM&R items from Table 12 is $149,851,013.

Item 1 – EO South and EQ Lateral Pipelines

This item includes replacing two sections of the existing open channel laterals with pipe. The EO South Pipeline conceptual design includes 22,493 feet of 12-inch diameter pipe. The EQ Lateral Pipeline conceptual design includes 8,554 feet of 8-inch diameter pipe and 7,181 feet of 15-inch diameter pipe. The total proposed pipe length for both laterals is 38,228 feet.

The total estimated cost for Item 1 is $1,589,868.

Table 12.—Uncompahgre Project List of Extraordinary OM&R Items

Priority	Item	Contract Cost Estimate	Cost Estimate Total
1	EO South and EQ Lateral Pipelines	$1,324,890	$1,589,868
2	AM South Pipeline	$1,592,106	$1,910,527
3	EO North and GK Lateral Pipelines	$7,695,697	$9,234,836
4	Lower Loutsenhizer Canal Pipeline	$9,008,549	$10,810,259
5	AM North Pipeline	$11,165,940	$13,399,128
6	Lower Selig Canal Pipeline	$20,107,605	$24,129,126
7	AB and AB-K Lateral Pipeline	$7,403,139	$8,883,767
8	GH/H Pipeline	$13,294,358	$15,953,230
9	EC Lateral Pipeline	$10,328,654	$12,394,385
10	East Canal Lining 7	$24,093,605	$28,912,326
11	Selig Canal Regulating Reservoir	$8,346,664	$10,015,997
12	East Canal Regulating Reservoir	$10,514,637	$12,617,564
COST ESTIMATE TOTALS		$124,875,845	$149,851,013

Item 2 – AM South Pipeline

This item includes replacing an open channel section of the AM Lateral with pipe. The conceptual design for this item includes sections of 15-inch through 36-inch diameter pipe totaling 16,294 feet. Also included are easements, road crossings, pressure regulators, turnouts, meters, SCADA, etc.

The total estimated cost for Item 2 is $1,910,527.

Item 3 – EO North and GK Lateral Pipelines

This item includes replacing two sections of existing open channel laterals with pipe. The ITRC report draft discusses two conceptual designs for this item: 1) includes pumping from the GK Lateral and not piping any of it, and 2) includes piping a portion of the GK Lateral to provide pressure and no pumping for the proposed EO North Pipeline. The latter option, which has a significantly higher capital cost and minimal O&M costs, is assumed for this report. This option includes sections of 8-inch through 48-inch diameter pipe for a total length of 80,943 feet. Also included are easements, road crossings, pressure regulators, turnouts, meters, SCADA, etc.

The total estimated cost for Item 3 is $7,695,697 (ITRC Option #2).

Item 4 – Lower Loutsenhizer Canal Pipeline

This item includes replacing a significant portion of the existing open channel canal with pipe. The conceptual design includes sections of 8-inch through 48-inch diameter pipe totaling 37,753 feet. Also included are easements, road crossings, pressure regulators, turnouts, meters, long-crested weir, SCADA, etc.

The total estimated cost for Item 4 is $9,008,549.

Item 5 – AM North Pipeline

This item includes replacing an open channel section of the AM Lateral with pipe. The conceptual design for this item includes sections of 8-inch through 42-inch diameter pipe totaling 54,277 feet. Also included are easements, road crossings, pressure regulators, turnouts, meters, SCADA, etc.

The total estimated cost for Item 5 is $11,165,940.

Item 6 – Lower Selig Canal Pipeline

This item includes replacing an open channel section of canal with pipe. The conceptual design for this item includes sections of 8-inch through 48-inch diameter pipe totaling 89,390 feet. Also included are easements, road crossings, pressure regulators, turnouts, meters, SCADA, etc. Operation of this item relies on the proposed Item 11 regulation reservoir.

The total estimated cost for Item 6 is $20,107,605.

Item 7 – AB and AB-K Lateral Pipeline

This item includes replacing the existing open channel laterals with pipelines. The conceptual design includes sections of 10-inch through 48-inch diameter pipe totaling 51,839 feet. Also included are easements, road crossings, pressure regulators, pressure regulating valves, turnouts, meters, SCADA, etc.
The total estimated cost for Item 7 is $7,403,139.

Item 8 – GH/H Pipeline

This item includes replacing the entire open channel GH Lateral and approximately 50 percent of the open channel Garnet Canal with pipe, plus installation of a new drainage pipeline. The conceptual design includes sections of 8-inch through 48-inch diameter pipe totaling 63,858 feet. Also included are easements, road crossings, pressure regulators, turnouts, meters, SCADA, etc.

The total estimated cost for Item 8 is $13,294,358.

Item 9 – EC Lateral Pipeline

This item includes replacing the existing unlined section of the EC Lateral's open channel with pipe, and installation of a supplemental "on-demand" pipeline. The conceptual design includes sections of 10-inch through 48-inch diameter pipe totaling 39,284 feet. Also included are easements, road crossings, pressure regulators, turnouts, meters, SCADA, etc.

The total estimated cost for Item 9 is $10,328,654.

Item 10 – East Canal Lining 7

This item includes lining the entire length of the East Canal (10.6 miles) with combined geotextile and shotcrete materials. The existing open channel will be enlarged and reshaped to increase capacity and the Item 12 regulating reservoir will act as a buffer to compensate for varying flow rates. Also included are easements, road crossings, turnouts, SCADA, etc.

The total estimated cost for Item 9 is $24,178,680.

Item 11 – Selig Canal Regulating Reservoir

The location of this proposed geotextile and shotcrete-lined regulating reservoir is where the Selig Canal will transition from open channel to the proposed pipeline

(Item 6) to buffer flow variations providing operational flexibility. The planned reservoir capacity is 80 acre-feet and it will be constructed with three cells. Flow through the piped cell connections will be controlled by float valves as a function of the lower cell water level, and emergency weirs are included in the design to allow flow over the cell dividers. The reservoir inlet/outlet capacity is 70 cfs. In addition to the above features, the conceptual design includes an inlet structure with a manual retraction trash screen, outlet structure, various gates and valves, measurement flume, SCADA, and land purchase.

The total estimated cost for Item 11 is $8,346,664.

Item 12 – East Canal Regulating Reservoir

This item includes a new regulating reservoir with a capacity of 60 acre-feet and respective inlet and outlet capacities of 140 cfs and 90 cfs. The reservoir will allow for increased flexibility in operating the East Canal laterals. The conceptual design includes excavation, reservoir lining, inlet and outlet features (conduit, structures, automation, SCADA, etc.), drains, and land purchase.

The total estimated cost for Item 12 is $10,514,637.