# CONTRACT AMENDMENT #2

| Amendment No.2 | Original Grant Agreement<br>No. C154210<br>Original CMS No. 48467<br>Amendment No. 1 CMS No. 70013<br>Amendment No. 2 CMS No. 83618 | CORE No. CT2015-72<br>Changed to<br>CT 2019-2880 |
|---|---|---|

**1) PARTIES**

This AMENDMENT No.2 (AMENDMENT) to the above-referenced ORIGINAL GRANT AGREEMENT (hereinafter called the "ORIGINAL AGREEMENT") is entered into by and between **San Luis Valley Irrigation District** (hereinafter called "GRANTEE" or "CONTRACTOR"), and the State of Colorado (hereinafter called the "STATE") acting by and through the Department of Natural Resources, Colorado Water Conservation Board, (hereinafter called "CWCB").

**2) EFFECTIVE DATE AND ENFORCEABILITY**

This AMENDMENT shall not be effective or enforceable until it is approved and signed by the Colorado State Controller or designee (hereinafter called the "Effective Date"), but shall be effective and enforceable thereafter in accordance with its provisions. The State shall not be liable to pay or reimburse Grantee for any performance hereunder, including, but not limited to costs or expenses incurred, or be bound by any provision hereof prior to the Effective Date.

**3) FACTUAL RECITALS**

The Parties entered into the ORIGINAL AGREEMENT to provide a number of long term water supply resolutions by developing a comprehensive, efficient water management plan of existing decreed water rights in and out of the Rio Grande Reservoir and other interconnected storage vessels that will result in a partnership among all beneficiaries of the Project. Additional funds are needed due to the complexity of the Cooperative Project and the many partners involved, including project management, redesign and the exchange of lands with the federal government. This AMENDMENT will increase the total grant amount by $584,040 and extend the ORIGINAL AGREEMENT expiration date to December 31, 2019.

**4) CONSIDERATION-COLORADO SPECIAL PROVISIONS**

Consideration for this AMENDMENT to the ORIGINAL AGREEMENT consists of the payments that shall be made pursuant to this AMENDMENT and ORIGINAL AGREEMENT and the promises and agreements herein set forth.

The Parties acknowledge that the mutual promises and covenants contained herein and other good and valuable consideration are sufficient and adequate to support this AMENDMENT.

**5) LIMITS OF EFFECT**

This AMENDMENT is incorporated by reference into the ORIGINAL AGREEMENT, and the ORIGINAL AGREEMENT and all prior amendments thereto, if any, remain in full force and effect except as specifically modified herein.

**6) MODIFICATIONS.**

The ORIGINAL AGREEMENT, NUMBER CT2015-72 (C154210) and all prior amendments thereto, if any, are modified as follows:

a) Amend the ORIGINAL AGREEMENT to increase the total grant amount by $584,040 increasing the GRANT AGREEMENT total amount from $1,256,134 to $1,840,174.

b) Extend the AGREEMENT end date to December 31, 2019.

c) The BORROWER agrees that it shall execute an AMENDMENT TO THE STATEMENT OF WORK, EXHIBIT A-1, AMENDMENT NO. 2, ORIGINAL AGREEMENT, CT2015-72, incorporated herein, which shall replace and supersede the original STATEMENT OF WORK, EXHIBIT A attached to the ORIGINAL AGREEMENT.

d) The revised SCOPE OF WORK shall revise Task 10-*Outlet Works Design* and add Task 16-*Construction Surveillance and Testing.*

e) Amend Paragraph 7A. *Payments to Contractor, Maximum Amount* to read:

The maximum amount payable under this Agreement to GRANTEE by the State is $1,840,174, as determined by the State from available funds. Payments to GRANTEE are limited to the unpaid obligated balance of the Agreement set forth in **Exhibit A-1**. The maximum amount payable by the State to the Grantee during each State fiscal year of this AGREEMENT shall be:

| |
|---|
| **$1,256,134 payable in FY13** |
| **$1,256,134 less the amount paid in FY13, is payable in FY14** |
| **$1,256,134 less the amount paid in FY14, is payable in FY15** |
| **$1,840,174 less the amount paid in FY15, is payable in FY16,** |
| **$1,840,174 less the amount paid in FY16, is payable in FY17.** |
| **$1,840,174 less the amount paid in FY17, is payable in FY18.** |
| **$1,840,174 less the amount paid in FY18, is payable in FY19.** |
| **$1,840,174 less the amount paid in FY19, is payable in FY20.** |

**7) EFFECTIVE DATE OF AMENDMENT**

The effective date hereof is upon approval of the State Controller or their delegate.

**8) ORDER OF PRECEDENCE**

Except for the Special Provisions, in the event of any conflict, inconsistency, variance, or contradiction between the provisions of this AMENDMENT and any of the provisions of the ORIGINAL AGREEMENT, the provisions of this AMENDMENT shall in all respects supersede, govern, and control. The most recent version of the Special Provisions incorporated into the ORIGINAL AGREEMENT or any amendment shall always control other provisions in the ORIGINAL AGREEMENT or any amendments.

**9) AVAILABLE FUNDS**

Financial obligations of the state payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, or otherwise made available.

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C154210
CT 2015-72
CMS No. 83618

**THE PARTIES HERETO HAVE EXECUTED THIS AMENDMENT**

*** Persons signing for Contractor hereby swear and affirm that they are authorized to act on Contractor's behalf and acknowledge that the State is relying on their representations to that effect.**

**CONTRACTOR**

~~San Luis~~ San Luis Valley **Irrigation District**

Name: Randall K. Palmgren

Title: President

*Signature

Date: Aug 28th 2015

**Attest:** **(SEAL)**

Name: Amy Dean

Title: Secretary

Amy Dean

*Signature

Date: 8-28-15

**STATE OF COLORADO**

John W. Hickenlooper, Governor
Department of Natural Resources
Mike King, Executive Director

By: Tim Feehan

Name: Tim Feehan, Deputy Director
Colorado Water Conservation Board

DATE: 9.1.15

**ALL CONTRACTS REQUIRE APPROVAL BY THE STATE CONTROLLER**

**CRS §24-30-202 requires the State Controller to approve all State Contracts. This Contract is not valid until signed and dated below by the State Controller or delegate. Contractor is not authorized to begin performance until such time. If Contractor begins performing prior thereto, the State of Colorado is not obligated to pay Contractor for such performance or for any goods and/or services provided hereunder.**

**STATE CONTROLLER**
**Robert Jaros, CPA, MBA, JD**

By: Susan Borup

Susan Borup, Controller
Department of Natural Resources

Date 10/9/15

# EXHIBIT A-1
# CT2015-72 (C154210)
## STATEMENT OF WORK
(Amended August 2015)

## BACKGROUND

The San Luis Valley Irrigation District (the District) owns and operates the Rio Grande Dam and Reservoir on the Rio Grande in southwest Colorado. The dam is an 111-foot high earth and rock fill embankment with a crest elevation of 9470 feet. Key features of the project include the dam with a crest length of approximately 450 feet, an un-gated spillway at the right abutment of the dam, and a low level outlet that includes an 11-foot high by 15-foot wide tunnel with a multiple sluice gate control structure near the middle of the tunnel. The reservoir is approximately six miles in length and 0.25 miles in width, oriented in a roughly northwest-southeast direction and has a capacity of 52,192 acre-feet.

A comprehensive study for rehabilitation and/or enlargement of the dam and reservoir was conducted by Deere & Ault Consultants, Inc. (D&A) and CDM in 2007 and 2008 ("*Rio Grande Multi-Use Rehabilitation and Enlargement Study*," CDM, 2008). That study estimated costs of $19.2 million for rehabilitation and $33.2 million for enlargement.

Construction of the dam began around 1908 with completion in 1914. The dam was constructed in a narrow valley between a massive volcanic formation known as Fish Canyon Tuff (at the right abutment) and a large rock slide that is a mixture of clays, sands, gravels, and large blocks of tuff (at the left abutment). The highly permeable rock slide material at the left abutment has been problematic since the first filling of the reservoir where seepage of the order of 1,500 gpm has been measured in the left abutment, with a total combined seepage of 2,500 gpm downstream of the dam. The seepage flow is responsive to reservoir elevation with flows increasing significantly at higher reservoir elevations (at gage 60 and above).

The low level outlet was originally constructed with 10 sluice gates, made up of five control gates and five upstream guard gates. The gates frames used a combination of concrete and steel framing to support the gates. When first operated, the gate structure experienced significant vibrations such that failure of the gates appeared likely. The response was to fill two of the three gate chambers with concrete and extend the concrete downstream of the gates for a length of 5 feet to create a more rigid structure. This initial repair was completed in 1915 and was apparently left unchanged until 1982. Between 1982 and 1999, a series of repairs were made to the control gates, including replacing the three active gates and reinforcing the framing around the gates. After the last repairs were made in 1999, the flows from the low level outlet have been restricted to approximately 1,200 cfs. Flows significantly greater than 1,200 cfs cause excessive vibrations in the gates, gate stems, and steel reinforcing downstream of the gates.

The dam was originally constructed with an unlined spillway at the right abutment. The spillway has been modified since its original construction by lengthening the crest of the spillway and lining the spillway deck and walls with concrete. A recent analysis on the spillway, performed by CDM in 2008, suggests that the spillway training walls are insufficient in height to pass the required 6,600 cfs design flow. The training wall height deficiencies exist at the entrance of the structure and continue throughout its length. The greatest concern with the spillway training wall heights exists on the left side. Any overflow of the left training walls has the potential to threaten the right abutment of the main dam. Based on the 2008 study, this appears to happen at flows below the design flow of 6,600 cfs.

The dam safety and operational issues described above combined with the value of the reservoir for optimizing water use for multiple stakeholders in the basin have driven the District to move forward with the rehabilitation of the Rio Grande Dam and Reservoir. The District is a proponent of the Rio Grande Cooperative Project where the District works with multiple stakeholders in the State, primarily the Colorado Water Conservation Board and the Colorado Division of Parks and Wildlife to restore the full use of the reservoir. The project is made up of three primary components (as shown on the attached figures), including:

- **Upstream Clay Blanket** – In order to reduce seepage through the rock slide formation at the left dam abutment, a clay blanket slope liner will be installed on the upstream side of the dam at the left abutment. The clay blanket, shown on Figure 1 in plan and Figure 2 in cross-section, will be a zoned fill placed over the rock slide and extending across the west abutment of the dam approximately 100 feet. The zones include a filter layer, low permeability clay core, and cover zone. This improvement is expected to substantially reduce seepage and allow the full storage capability of the reservoir to be achieved.

- **Low Level Outlet** – The existing low level outlet will be replaced with a hollow jet valve discharge structure at the downstream side of the dam. The existing low level outlet tunnel will continue to be used to provide conveyance between the upstream and downstream portals. The existing sluice gate control structure will either be demolished or abandoned in-place with a bypass tunnel providing conveyance around the structure; this is shown on Figure 1. Schedule constraints for the work and the uncertainty of the demolition costs (for removal of the existing sluice gate control structure) suggest that the construction bidding process may be the best way to determine the most economic solution. To that end, we recommend preparing the bidding documents with two options: Option 1 – Demolish Existing Sluice Gate Structure and Option 2 – Construct Bypass Tunnel and Abandon Sluice Gate Structure. The District can then select which option is most economic based on the results of the bidding. Another important element of the low level outlet work is the provision for the future addition of hydropower. To allow hydropower to be added in the future with minimal disturbance to the primary function of the project, a tap will be provided at the low level outlet (downstream of the tunnel portal) which can be used to route flows to future turbine generator units.

- **Spillway Improvements** – In order to achieve the spillway capacity required by the State Engineer's Office (SEO), the entrance training walls will require a substantial raise and the main channel training walls will require a roughly 2 to 6-foot raise. This is expected to be accomplished by a combination of cast-in-place concrete and perhaps shotcrete. Additionally, some of the existing spillway floor slabs will require replacement or rehabilitation due to the condition of the existing concrete.

The following section presents D&A's scope of services for the work.

## SCOPE OF SERVICES

### Task 1 - Project Management

The San Luis Valley Irrigation District (the District) will use Deere & Ault Consultants, Inc. (D&A) as the prime subconsultant. Efforts under this task will include coordination between the District and subconsultant, other stakeholders, and the Office of the State Engineer, Division of Water Resources (SEO) through meetings, teleconferences, email, and correspondence; scheduling and coordinating the efforts of the design team; preparation of progress reports for the District; and monthly invoice preparation.

Deliverables: Progress Reports, Meeting Minutes, and Monthly Invoices

## Task 2 - Surveying

Surveying and mapping will include detailed topographic mapping of the dam site and eastern reservoir rim, establishment of construction benchmarks, and an underwater inspection of portions of the project. Base maps of as-built conditions of the tunnel and spillway structures will be prepared in order to prepare accurate design plans. A boundary survey will be completed and used to develop a legal description of the property needed for the outlet discharge structure.

The topographic survey will be subcontracted and accomplished using LiDAR mapping techniques. Topographic maps of the dam and appurtenant structures with one-foot contours will be prepared. LiDAR mapping of the ancient block slide and eastern one-third of the reservoir rim covering over 1.7 square miles will also be performed in order to evaluate and monitor reservoir rim stability. Mapping resulting from the LiDAR survey will use state plane coordinates and the NAVD88 vertical datum. Four benchmarks will be established during this task that will serve and control points for construction staking. The benchmarks will be located to be near the work, but outside the anticipated construction zone. Structure surveys of as-built dimensions of the tunnel and spillway will be made in the field.

A remote operated vehicle (ROV) will be used to perform an underwater survey of the upstream tunnel portal and underwater portion of the rock slide at the left abutment. The objective of this survey is to determine the condition of the cofferdam and gates at the upstream tunnel portal and to gain an understanding of the size and distribution of materials at the submerged portion of the rock slide that will be covered by the clay blanket. The ROV survey will be recorded on audio and video, and made available to the design team and construction contractors during the bidding period.

Deliverables: Topographic Survey, Construction Benchmarks, Boundary Survey, Structure Surveys, and ROV Survey

## Task 3 - Geotechnical Exploration

This task includes the field work required to acquire the geotechnical data for design of the rehabilitation. Comprehensive geotechnical studies of the site were conducted by Chen & Associates (1983) for the 1983 construction improvements. This work includes drilling of 12 borings, installation of six piezometers and two inclinometers, and laboratory testing of soil and rock. Currently, there are four functioning piezometers that are monitored on a regular basis. Only one inclinometer remains on-site and no historical baseline data appears available for this instrument.

Comprehensive geologic mapping of the reservoir was conducted in 2007 by Robert Kirkham and D&A as part of the CDM (2008) study. Additional studies of reservoir rim stability were recommended by Mr. Kirkham. Additional geologic mapping of the block slides on the northeast part of the reservoir will be performed under this contract, as well as perform LiDAR surveying (as described above) and install instrumentation at the base of the slide.

A total of four rotary borings (three core and one ODEX), nine auger borings, and 12 test pits are proposed. The investigation plan is summarized in the table below:

| Hole Number | Depth (feet) | Description |
|---|---|---|
| RG-12-1 | 150 | ▪ Install inclinometer and 2 vibrating wire piezometers (VWP)<br>▪ Investigate reservoir rim block slide<br>▪ Core hole with telelogger |
| RG-12-2 | 150 | ▪ Install inclinometer and 1 VWP<br>▪ Investigate left abutment rock slide<br>▪ ODEX hammer hole; blow counts with telelogger |
| RG-12-3 | 120 | ▪ Install 1 VWP<br>▪ Investigate bypass tunnel and water level in right abutment; core hole |
| RG-12-4 | 30 | ▪ Investigate outlet discharge structure foundation |
| B-12-1 through B-12-4 | 15 | ▪ Clay borrow - auger from barge |
| B-12-5 through B-12-9 | 15 | ▪ Investigate clay borrow west of existing reservoir waterline in reservoir bottom |
| TP-1 through TP-6 | 10 to 15 | ▪ Dig test pits west of existing reservoir water line for clay borrow |
| TP-7 through TP-12 | 10 to 15 | ▪ Dig test pits along northeast shoreline in area of proposed clay blanket |

Four vibrating wire piezometers (VWP) will be installed in the new borings and install four VWPs in the existing piezometers, which will allow for continuous digital collection of the data. D&A will install two additional inclinometers and perform a baseline inclinometer survey and two follow-up surveys on all three. The land based borings will be drilled with a truck-mounted (or "mud-buggy") type rig to allow for access in difficult terrain.

One deep boring will be used to investigate the block slide northwest of the dam. One deep boring will investigate the left abutment rock slide. The third deep boring will be drilled in the right abutment rock in the area of the proposed bypass tunnel. Select borings will be Packer tested for permeability evaluation. Two of the borings will be logged by Colog with a televiewer. D&A will also investigate the proposed outlet structure foundation with a boring.

A source of clay borrow for clay blanket construction is needed. It is expected that clay may be obtained from the reservoir floor. It appears that the landslide on the left abutment dammed a natural lake at the same location as the current dam, and based on the flat valley bottom topography it probably existed for several thousand years. Thus, it is expected that natural lake bed clays in the reservoir bottom will be found.

D&A will drill four auger borings from a barge to confirm the presence of clay. D&A will also drill five auger borings on land upstream of the water line when the reservoir is at gage height 50 or below. D&A will excavate about 12 test pits using a large track-mounted excavator. Half of the pits will be excavated upstream of gage height 50 water level to look for clay. The other test pits will be excavated along the shoreline in the rock slide mass of the left abutment where the clay blanket is to be constructed.

D&A will also evaluate the spillway concrete by taking a few short core holes of the slab and walls. If possible, D&A will try to obtain core of concrete in the gate structure for testing of unconfined compressive strength.

Samples obtained from the exploratory drilling and test pits will be tested in the laboratory. Laboratory testing will be designed to provide information for designing the clay blanket, bypass tunnel, and outlet discharge structure foundation. Laboratory testing will include: moisture/density, Atterberg limits, -200 sieve, gradations, pin-hole dispersivity, triaxial shear tests, direct shear tests, and unconfined compressive strength tests. The test results will develop parameters to be used in the subsequent design analysis.

Deliverables: Detailed description of geologic boring logs, televiewer lots, and laboratory test results

**Task 4 - Geotechnical Analysis**

Data obtained from the field and geotechnical investigations and from the laboratory testing will be analyzed in order to develop clay liner design. It is expected that the analysis will include stability for the proposed liner and seepage analysis for the existing dam embankment and proposed clay blanket liner, as well as analysis of material quantities and the strength parameters, and other properties for the soil and bedrock. This stability analysis will address the loading conditions mandated by the SEO for Class I high hazard jurisdictional dams. D&A will also perform additional analysis of reservoir rim stability.

Deliverables: Geotechnical Analysis Calculations Appendix

**Task 5 - Hydraulic Analysis**

A hydraulic analysis will be completed for the spillway rehabilitation and low level outlet works. The spillway hydraulic analysis will use the maximum spillway discharge based on the Inflow Design Flood (IDF) established by CDM in 2008 based on the State of Colorado's Extreme Precipitation Analysis Tool (EPAT). Using the anticipated final line and grade of the spillway channel, a hydraulic profile will be created from the spillway entrance to the spillway terminus. The analysis will be prepared using 1-D numerical and analytical techniques to determine depths for gradually varied flow, normal depths, super elevation at the spillway bend, velocities, and freeboard requirements. The condition of the spillway plunge pool will also be investigated to assess its ability to successfully operate without damage under spill conditions.

The hydraulic analysis for the low level outlet works will involve analytical techniques to determine normal and surge pressures in the tunnel, lined tunnel, and pipeline portions of the outlet; velocities along the entire low level outlet works; cavitation analysis; guard valve and control valve operating conditions and flow ranges; control valve discharge plume; and plunge pool and embankment protection requirements. The outlet works capacity will be optimized based on the existing tunnel dimension restraints.

Deliverables: Hydraulic Analysis Calculations Appendix

**Task 6 - Basis of Design Report**

A Basis of Design Report as required by the SEO will be prepared that describes the planned improvements to the dam and appurtenant facilities and provides a record of the field work and analysis portions of the work. Following is a preliminary outline for the report:

Section 1 - Executive Summary
Section 2 - Introduction
Section 3 - Geotechnical Considerations
Section 4 - Hydraulic Considerations
Section 5 - Rehabilitation Alternatives Considered
Section 6 - Description of Spillway Rehabilitation
Section 7 - Description of Low Level Outlet Works
Section 8 - Description of Clay Blanket
Section 9 - Other Issues
Section 10 - Construction Cost Estimate
Section 11 - Construction Schedule
Appendices with logs, test results, and calculations

The final report that will be submitted to the SEO will include the District's comments along with the design team's internal QA/QC comments.

Deliverables: Draft and Final Basis of Design Reports

**Task 7 - Spillway Rehabilitation Design**

Drawings and Technical Specifications will be prepared for the spillway rehabilitation portion of the project. This is anticipated to include spillway entrance training wall additions, raising the training walls along the right and left sides of the spillway chute, replacement or rehabilitation of failed spillway slabs, and armoring in the area of the plunge pool.

Drawings will be prepared in AutoCAD 2011, or later version, using D&A's company standards. Drawings will be prepared in 22-inch by 34-inch format with true half-sizes at 11-inch by 17-inch. Technical Specifications will follow the 17 Division CSI format. D&A's standard technical specifications will be followed and the District's standard front-end contract documents will be used.

Progress submittals will be made at the 30 percent, 90 percent, and 100 percent levels of completion. Progress submittals will be made electronically and at half-size hard copy. At the 100 percent level of completion, documents will be full size signed and sealed in accordance with Colorado law and submitted to the SEO for review and approval. It should be noted that the progress submittals for other portions of the work will be combined in a single drawing and specification set.

Deliverables: 30 percent, 90 percent, and 100 percent Drawings and Technical Specifications

**Task 8 - Clay Blanket Design**

Drawings and Technical Specifications will be developed for the upstream clay blanket permeability barrier. Drawing and specification format and progress submittals will be the same as described under Task 7. The design of the clay blanket is expected to include plans, cross-sections, and details that describe the site preparation required in advance of blanket installation; location of the clay blanket; and thickness, material type, and gradation for each zone. This task will also cover the design and installation of additional toe drains on the downstream left abutment of the dam.

Deliverables: 30 percent, 90 percent, and 100 percent Drawings and Technical Specifications

**Task 9 - Bypass Tunnel Design**

Drawings and Technical Specifications will be developed for the bypass tunnel option. Drawing and specification format and progress submittals will be the same as described under Task 7. The design of the bypass tunnel will involve a 14-foot finished diameter tunnel that bypasses the existing sluice gate structure in the outlet tunnel and will be included in the contract documents as Option 2. Work in this task will also include the design of Option 1 which involves the demolition of the existing sluice gate structure with no bypass tunnel constructed. The Option 1 design will include demolition drawings, rock anchoring portions of the old concrete, and installation of a new reinforced concrete or shotcrete crown liner to create a hydraulically smooth crown of the tunnel where the gate structure was removed. The design of the bypass tunnel will include rock bolt support design for the tunnel intersections and thin shotcrete liner for pressurized tunnel sections.

Deliverables: 30 percent, 90 percent, and 100 percent Drawings and Technical Specifications

## Task 10 - Outlet Works Design

Drawings and Technical Specifications will be developed for the outlet works portion of the project. Drawing and specification format and progress submittals will be the same as described under Task 7. The design of the outlet works will include lining the lower portion of the tunnel with an 11-foot diameter steel pipeline, a buried pipeline between the downstream tunnel portal, and a new outlet valve house. The valve house will be a reinforced concrete structure that supports and encloses guard valves and hollow jet control valves. A small steel control building will be designed to sit atop the valve house for protection of the valve actuators and control equipment. A plunge pool will be designed downstream of the outlet valves to prevent erosion of the stream bed. Armoring of the right and left embankments to prevent valve discharge erosion will also be included in the design.

Provisions will be made in the design to accommodate the addition of future hydropower generation to the facility. This is assumed to include a 72-in. diameter, or larger, tap in the outlet conduit upstream of the hollow jet valves. The excavation for the valve house will be designed such that the rock at the right abutment allows for the future powerhouse excavation to be accomplished in proximity to the valve house.

A combination trash rack/bulkhead gate structure will be designed for the upstream tunnel portal. The objective of this structure is to provide upstream isolation of the outlet tunnel. This will allow the outlet tunnel and outlet works to be "unwatered" for inspection and maintenance without requiring reservoir draw down.

***The final design efforts associated with the outwork works will require additional time to complete given the complexity of the bypass tunnel, phasing of the project, and the research and collaboration with the outlet valve supplier. The additional hours anticipated to complete the final design of the outlet works is summary on the attached man hour spreadsheet.***

Deliverables: 30 percent, 90 percent, and 100 percent Drawings and Technical Specifications

## Task 11 - QA/QC

Each product produced for the District will be independently reviewed by D&A senior project staff that are fully familiar with the type of work, but not involved in the day to day execution of the particular product. The reports and memoranda will be reviewed for adherence to industry standards and engineering practice, accuracy of calculations, and compliance with our agreement with the District. Design drawings and specifications will be reviewed at the 90 percent level of completion for the following:

- Discipline Review (each of civil, structural, mechanical, electrical and I&C)
- Interdisciplinary Review (cross checking between disciplines)
- Constructability Review
- Specification Review
- Cost Estimate Review
- Final Red/Yellow Check

The District and stakeholder comments will be addressed and responded to at each level of design completion.

Deliverables: Fully checked Bid Ready Contract Documents, Memoranda and Reports

**Task 12 - Cost Estimating**

Cost estimates will be prepared for the work at the 30 percent, 90 percent, and 100 percent levels of completion. The estimates will be based on quantity takeoffs, material and equipment pricing, labor cost and productivity, and estimates of contractor's bonds, insurance and overhead and profit. The early estimates will carry greater uncertainty and therefore greater contingency. A final engineer's estimating contingency of 10 percent will be applied to the job.

Deliverables: 30 percent, 90 percent, and 100 percent Engineer's Estimates

**Task 13 - Respond to State Engineer's Office Comments**

The 100 percent Plans, Specifications, and Basis of Design Report will be submitted to the SEO for review and approval. We will meet and work with the SEO throughout the design process to receive their input early on. However, our experience is that the SEO will be provide a thorough review of the 100 percent documents and there will be significant comments that will have to be addressed in order to obtain the final approved contract documents signed by the State Engineer that are ready for bidding. This task includes the work required in order to respond to their comments and achieve approval.

**Task 14 - Permitting Assistance**

The District will rely upon D&A to support the District's permitting consultant to review permitting strategy, include permit requirements in the construction contract documents, and provide design information to the permitting team. It is understood that the professional services time included for this task is an estimate and maybe insufficient if the permitting process becomes lengthy or controversial. For example, permitting could be more difficult, even requiring the NEPA process, if the land downstream of the toe of the dam is not obtained through a land swap with the U.S. Forest Service. Any change in the dollar amount for this task will require a formal amendment to the contract.

**Task 15 - Bidding and Award**

The District will rely on support from D&A in conducting the contractor's pre-bid walk through, answering bidder's questions, issuing addenda, bid evaluation and reference checking, and preparation of a recommendation for award.

***Task 16 – Construction Surveillance and Testing***

***The District will rely upon D&A to perform construction surveillance and testing during the development of the clay liner material, the construction of the clay liner itself, and the construction of the outlet works. The personnel, hours and cost per hour for this activity are summarized on the attached man hour spreadsheet.***

## PROJECT TEAM FOR PRIMARY SUBCONTRACTOR DEERE & AULT CONSULTANTS, INC.

The Project Manager and Principal-in-Charge will be Don W. Deere, P.E. Don is a geotechnical engineer with over 35 years experience in the design of dams, reservoirs, and tunnels. His is Engineer of Record on over 10 dams and six tunnels in Colorado. The Project Engineer will be Glen G. Church, P.E. Glen has over 18 years experience in the design of dams in Colorado.

Don and Glen will be assisted as needed by the D&A staff of 25 professionals in the Longmont, Colorado office. The staff includes experienced hydraulic engineers, civil engineers, engineering geologists, and CAD designers.

D&A will be assisted by Engineering Science Construction, P.C. (ESC) of Boise, Idaho. ESC will be responsible for outlet works design and structural engineering. ESC will be lead by Ray Eldridge, P.E. with over 28 years experience in large hydraulic structures. Ray's special expertise is hydraulic gates and valves, and hydroelectric power facilities. He will be assisted by structural engineer Grant Horeczy, P.E.

LiDAR mapping will be conducted by the Denver office of Merrick & Company, leaders in this field. On-ground survey support will be provided by the Alamosa, Colorado office of Davis Engineering. Geotechnical drilling and testing will be subcontracted to Terracon of Denver. Colog of Denver will provide televiewer logging. Mr. Robert Kirkham will assist D&A in landslide mapping and evaluation.

## SCHEDULE

It is assumed that the surveying task will be authorized by the District in advance of the main work and that authorization for the entire project will be given sometime after July 1 of 2012. The work under this Statement of Work shall be completed by December 31, 2019.

## COMPENSATION

The contract work described above on a time and materials basis with a not to exceed amount of $1,840,174. The attached spreadsheet provides a detailed breakdown of the fees. It is understood by the parties that as the project evolves and additional data is obtained, that tasks and their associated schedule and costs may be modified (decreased or increased) to reflect current needs for successful completion of the project. It is understood that the District will not exceed the estimated total without first obtaining a fully executed amendment to the contract.

### Performance Monitoring

Performance monitoring for the contract shall include the following:

(a) Performance measures and standards

- The CWCB will have monthly meetings with the vendor and the Engineering CO to make sure the project is being completed in a timely manner.

(b) Accountability.

- Regular reporting of project status will occur monthly with the CWCB project manager and the lead project manager from the vendor and the Engineering CO.

(c) Monitoring Requirements

- The CWCB will have access to all the plans associated with the Rio Grande Dam and Reservoir rehabilitation and enlargement.

(d) Noncompliance Resolution

- Noncompliance resolution will be handled through the contract resolution.

# EXHIBIT A-1
## Rio Grande Reservoir Improvements

| | | Deere & Ault Consultants, Inc. | | | | | | Engineering Sceince Construction, P.C. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Task | Title | Project Manager 225 ($/hr) | Eng 1 150 ($/hr) | Eng 2 90 ($/hr) | Eng 3 75 ($/hr) | Designer 85 ($/hr) | Admin 70 ($/hr) | Partner 154 ($/hr) | Sen. Assoc 138 ($/hr) | Assoc. 94 ($/hr) | Senior Designer 121 ($/hr) | Secretary 66 ($/hr) | Travel & Printing ($) | Other Subcontracts ($) | Task Total |
| 1 | Project Management | 100 | 300 | | | | 80 | | | | | | $ 10,000 | | $ 83,100 |
| 2 | Surveying | 20 | 60 | | | | | | | | | | | $ 71,500 | $ 85,000 |
| 3 | Geotechnical Exploration | 100 | 60 | 400 | 350 | | | | | | | | $ 16,000 | $ 169,000 | $ 278,750 |
| 4 | Geotechnical Analysis | 40 | 40 | 200 | 200 | | | | | | | | | | $ 48,000 |
| 5 | Hydrauic Analysis | 24 | 120 | | 80 | 40 | | 48 | | 60 | | | | | $ 45,832 |
| 6 | Basis of Design Report | 100 | 80 | 120 | 100 | 80 | 60 | 120 | 40 | 80 | 60 | 24 | $ 2,400 | | $ 106,564 |
| 7 | Spillway Rehab Design | 40 | 160 | 120 | | 80 | | 16 | 240 | 40 | 160 | 12 | $ 1,200 | | $ 111,296 |
| 8 | Clay Blanket Design | 80 | 240 | 400 | 300 | 300 | 40 | | | | | | | | $ 140,800 |
| 9 | Bypass Tunnel Design | ***160*** | ***160*** | ***160*** | | ***160*** | ***50*** | | | | | | | | $ 91,500 |
| 10 | Outlet Works Design | ***40*** | ***80*** | | | | | ***340*** | ***220*** | ***340*** | ***600*** | ***80*** | ***$ 20,000*** | | $ 233,560 |
| 11 | QA/QC | 40 | 80 | | | | | 24 | 60 | | | | | | $ 32,976 |
| 12 | Cost Estimating | 16 | 80 | | | | | 40 | | | | | | $ 10,000 | $ 31,760 |
| 13 | Respond To SEO Comments | 40 | 80 | | | 40 | 16 | 24 | 16 | | 16 | | | | $ 33,360 |
| 14 | Permitting Assistance | 40 | 80 | | | | | 24 | | | | | | | $ 24,696 |
| 15 | Bidding and Award | 20 | 80 | | 40 | | 8 | 60 | 24 | 8 | 24 | 12 | $ 4,000 | | $ 41,060 |
| 16 | ***Construction Surveillance/Testing*** | ***100*** | ***2,304*** | | | ***100*** | ***576*** | | | | | | ***$ 35,000*** | | ***$ 451,920*** |
| | Total Hours | 960 | 4,004 | 1,400 | 1,070 | 800 | 830 | 696 | 600 | 528 | 860 | 128 | | | |
| | **Project Total** **$ 1,840,174** | $216,000 | $600,600 | $126,000 | $ 80,250 | $ 68,000 | $ 58,100 | $ 107,184 | $ 82,800 | $ 49,632 | $ 104,060 | $ 8,448 | $ 88,600 | $ 250,500 | ***$ 1,840,174*** |

***Amended August 2015***