

## **Statement of Work**

**WATER ACTIVITY NAME** – Super Ditch Delivery Engineering

**GRANT RECIPIENT** – Lower Arkansas Valley Water Conservancy District

**FUNDING SOURCE** – Statewide Account and Matching

### **INTRODUCTION AND BACKGROUND**

The Super Ditch Delivery Engineering is an extension of the existing Lower Arkansas Valley Water Conservancy District Super Ditch program that CWCB previously funded. The Lower Arkansas Valley Water Conservancy District and the Super Ditch Company are seeking to preserve agriculture in the Lower Arkansas Basin with temporary water transfers, and other methods, that can benefit both the municipal interests and those of the local agricultural-based economy.

This additional engineering work will enable a better understanding of the water resources in the Lower Arkansas Basin, including water stored in reservoirs, and better modeling of the water resource operations for the Lower Arkansas Valley Water Conservancy District and the Super Ditch Company, as well as for other regional water planners. This modeling information is critical to the Super Ditch program's decision points and efficient use of the State's water resources.

### **OBJECTIVES**

The objectives are as follows:

- Objective 1 – Reservoir Operations: The major reservoirs in the Lower Arkansas Basin are key to efficient and accurate operations for creating an alternative to agricultural transfer scenarios. The major reservoir information will be reviewed with recommendations as to how to fill or operate for proper modeling into the future.
- Objective 2 – Pueblo Reservoir: Pueblo Reservoir is very complex and difficult to model without a detailed understanding of its operations and the data. Pueblo Reservoir has been identified as the preferred alternative to the storage and operations of the Super Ditch scenarios from previous CWCB funded studies. During those studies, many stakeholders identified the need to adequately model Pueblo Reservoir operations and spill frequency. This task will include meeting with the operators of the reservoir and identifying data and operating principals to accurately model the integration of Super Ditch storage with the reservoir.
- Objective 3 – Winter Water Storage Program (WWSP): This task will seek to account for and model the WWSP for the operational scenarios developed in previous CWCB funded studies. The WWSP is a very large part of the agricultural water rights in the area and needs to have a detailed dataset and operational understanding to properly model any changes to the operations or external changes that may affect the WWSP.

- Objective 4 – Model Operations: System Calibration and Optimization: The model must be calibrated to replicate historical flow data from the river and operate in a manner consistent with the actual river operations to model exchanges and return flows in the Arkansas River. Once calibrated, operational scenarios can be created to optimize the system. Several scenarios are a result of the first CWCB funded Super Ditch operational model that demonstrated large portions of the supplies from the interested canals that may not be available for direct exchange during the entire irrigation season. During those times, there are several options to recover these supplies that can be explored. This task will seek to discover feasible means to recover these flows and utilize them by participants or enable them to be exchanged at a later point in time.
- Objective 5 – Engineering and Economic Integration: This task will finalize the modeling and integrate the water resources modeling results with the results of the economic modeling to yield a final plan of operations for the Super Ditch scenarios. The models have been operating within similar assumptions, but a final update of the water modeling using some of the financial constraints is needed to accurately depict operating scenarios.
- Objective 6 – Legal limitations: The ability to exchange water into Pueblo Reservoir is limited by a complex array of decrees and agreements, including Pueblo's RICD and the WWSP. This task will provide essential input for the engineering work because exchanges into and storage in Pueblo Reservoir and other intermediate storage reservoirs is limited under the WWSP, various court decrees, the Pueblo flow management agreement, and other intergovernmental agreements.

## **TASKS**

Provide a detailed description of each task using the following format

### **TASK 1 – Reservoir Operations**

This task will describe the major reservoirs in the Lower Arkansas Basin that contribute to the irrigation of lands and that can be part of an alternative to agricultural transfer program. This task excludes Pueblo Reservoir as it is detailed below in a separate task, but includes the major off-channel reservoirs of Lake Meredith, Great Plains Reservoirs, and John Martin Reservoir. The reservoir operations may need to be modified for Super Ditch deliveries, which could alter the basin operations and return flow patterns over time. This work will be limited to the time period from 1980 through present day. The time period before the 1980's was before the WWSP and the river dynamics were much different.

#### Description of Task

##### **Task 1.1 Reservoir Operations: Describe Reservoirs and Their Operations**

This task outlines each reservoir, their typical operations, their diversion and storage amounts, any excess capacities, and any restrictions on their systems that may exist.

#### Method/Procedure

Meeting(s) with Division 2 Engineering personnel will take place to detail each reservoir and its operations. The meeting(s) will review each of the reservoirs, their decrees, typical seasonal operations, diversions and other information pertinent to operations. An attempt will also be made to meet with the various reservoir companies to detail their operations, review and gather their diversion and storage data, and review operation details for later use. The modeled reservoirs will have their respective decrees and the Hydrobase records reviewed to determine the suitability of the information.

#### Deliverable

This task includes a memo detailing the operations of the reservoirs, their typical diversion pattern, typical release schedule, and a review of their decrees. This will also include modeling parameters that can be used to simulate their operations in future water transfer scenarios.

#### Description of Task

##### Task 1.2 Reservoir Operations: Model Construction

Although these various models have been successfully completed, a StateMod model of the Lower Arkansas River Valley representing the reservoirs does not currently exist. Therefore, prior to improving the representation of the lower basin reservoir operations, the basin must first be representing in StateMod model format.

Previous modeling efforts have focused on calculation of exchange potential within the Study Area using readily available stream flow and diversion data (predominantly DWR HydroBase data) that were manipulated using Microsoft Access and Microsoft Excel software by Leonard Rice Engineers and Montgomery Watson Harza. The previously developed models, and the Microsoft Access and Microsoft Excel models identified, will be used as much as possible in development of the StateMod model datasets in order to benefit from existing basin operations knowledge and to limit duplication.

#### Method/Procedure

The individual reservoir information will be queried and compared to the other information to determine suitability for use in the detailed modeling. Stream gages from top of Study Area (Pueblo Reservoir inflow) to bottom of Study Area (John Martin Reservoir outflow) will be included in the modeling effort to capture all the reservoirs in the modeling. Tributaries to the Arkansas River within the Study Area will be represented by lower tributary basin stream gages where they exist. The diversions of the reservoirs and their associated delivery structures will be represented in the modeling also. Most of the remaining major diversions will be represented in the model. The information will be compared to the reservoir data collected in Task 1.1. The missing data may be estimated or filled based upon the available data.

#### Deliverable

This task will be completed with a memo that identifies discrepancies that may exist and recommended methods to fill or alter the data to more accurately model historic conditions on the Lower Arkansas System. This task could, if needed, yield a modified dataset of input files for use in the modeling. This may be accomplished with command files or text datasets.

### Description of Task

#### Task 1.3 Reservoir Operations: Data

This task will seek to review the data within Hydrobase and compare it to the records from the reservoir operations investigation and identify any discrepancies that may exist. This task will also seek to establish basic parameters to estimate the data in error or missing data for each of the identified reservoirs.

### Method/Procedure

This method will seek to populate the database related to Model Nodes (HydroBase data and information collected in this engineering study). The StateMod program requires input datasets that have no missing data. Therefore, any monthly time series data missing for the model Study Period (1980 to present) will be filled based on standard methodologies that will be supplemented with approaches used in previous Arkansas River Basin modeling efforts and information gathered during this study.

### Deliverable

This task will be completed with a memo that identifies discrepancies that may exist and recommended methods to fill or alter the data to more accurately model historic conditions on the Lower Arkansas System. This task could, if needed, yield a modified dataset for use in the modeling. This dataset may include Historical Streamflow, Ditch Capacities, Historical Ditch Diversions, Historical Irrigated Acreage and Crops, Ditch Loss, Return Flows Locations, Amounts, and Timing, Ditch Rights, Reservoir Storage Volumes, Reservoir Feeder Canals, and Capacities, Reservoir Account Owners and Capacities, Feeder Canal Loss, Monthly Net Evaporation Rates, Reservoir Seepage Rates, Historical End-of-Month Contents, Historical Releases, Storage Rights, Historical and Current Administrative Operations not related to Reservoirs. John Martin Reservoir will be the terminus of the Study Area and without explicit representation of downstream water demands, return flows, and operations, the model representation of John Martin Reservoir will, to a certain extent, be limited. This data may be accomplished with command files, a database, or text datasets.

### Description of Task

#### Task 1.4 Reservoir Operations: Simulate River Basin Operations to Assure Validity of Model Setup and Input Data

This task will update the StateMOD modeling, which was created to develop scenarios for the Super Ditch operations in previous CWCB funded project models.

### Method/Procedure

This task will repeat various steps from above until model simulation is considered adequately representative of actual conditions. These model simulations will provide estimates of exchange potential and non-exchangeable (i.e., recoverable) supplies incorporating reservoir operations. The modeling may include updated reservoir release and diversion records along with relevant loss information about inlets, evaporation and other information gained through previous tasks. The various model inputs and steps discussed above will be subsequently tested, revised, etc. during model calibration discussed below.

### Deliverable

The modeling of the Super Ditch scenarios will be updated to reflect the new reservoir patterns and their associated availability to store water for delivery to municipal and industrial users during the non-irrigation season.

## **TASK 2 – Pueblo Reservoir**

This task is to model Pueblo Reservoir including spill potential during times when the reservoir fills from native flows in addition to the Fry-Ark project water. The reservoir contains many accounts within its storage allotment and they are operated on a priority system. The junior spill priorities are often full at times when the reservoir approaches spill and therefore are emptied during the filling season and replaced with other water. The task will model a new junior reservoir account to determine its reliability, spill quantity, spill frequency, and the likely timing of a spill from the reservoir. The task will also include changes to the existing reservoir model created in previous Super Ditch tasks to allow for changes in river operations and river conditions to determine its impact on Pueblo Reservoir spills.

### Description of Task

#### Task 2.1 Pueblo Reservoir: Describe Accounts and Operations

This task will be to determine the accounts within the reservoir and how they operate. The accounts could be detailed as to their owners, volumes, and priority in the overall reservoir system. The operations of the system will also be determined to describe the reservoir operations and how the accounts are administered by the various agencies involved.

### Method/Procedure

This task requires several meetings to determine the accounts and operations, and will likely include meetings with the Bureau of Reclamation, Southeastern Colorado Water Conservancy District, and Colorado Division of Water Resources Division 2 staff.

### Deliverable

This task will be completed with a memo describing the operations of the reservoir and a list of the accounts to be modeled.

### Description of Task

#### Task 2.2 Pueblo Reservoir: Data

This task will be the data collection for the Pueblo Reservoir system. The reservoir is operated and administered daily by several different agencies whose data may not be consistent. As part of the modeling operations of the reservoir model, reservoir data may be compiled and reconciled against one another to determine a dataset that could be used for future modeling efforts. This data will have a study period from 1979 through 2009 of the daily reservoir contents, daily inflows, daily outflows and daily account contents among other pertinent information.

### Method/Procedure

This task requires several meetings to determine what data exists with each of the agencies and in what format. The key stakeholders in this task will be the Bureau of Reclamation, Southeastern Colorado Water Conservancy District, and Colorado Division of Water Resources Division 2 staff. Monthly and daily data will be collected and incorporated into the model database. Daily data collected for this effort will be accessed during model simulations on a daily time step once the model is sufficiently calibrated on a monthly time step. This task will incorporate various information collected during this engineering study, including: Storage and Release Data related to natural flows, WWSP Water, and Fry-Ark Water; and Operational Protocol, including Internal Administration of Reservoir Accounts. Representation of WWSP

water will be further improved in a subsequent task below.

Deliverable

This task will result in a memo describing the data to model the operations of the reservoir, and the reconciliation process that was performed. The results will also include a modified dataset to update the existing modeling efforts. That information will be available for analysis for the following task.

Description of Task

Task 2.3 Pueblo Reservoir: Modeling

The modeling task will be to integrate the new information from the previous two sub-tasks with the existing modeling of Super Ditch operation scenarios.

Method/Procedure

The modeling will transform the reservoir operations into operating rules for the StateMOD model to be utilized as updated logic of the system operations. In addition, any updated diversion, release, and storage data will also be input into the StateMOD data to further model Pueblo Reservoir and the specific conditions that lead to a spill. The new information will allow the model, when projecting river system changes from Super Ditch, to better determine how and when spills may take place and the reliability of using a junior storage priority in Pueblo Reservoir as a storage location for transferred supplies.

Deliverable

The results of this task will be a memo describing the model procedure and updated Super Ditch operational scenarios results.

**TASK 3 – Winter Water Storage Program**

A major use of Pueblo Reservoir since the late 1970's has been the WWSP. This program stores irrigation water that was historically placed on farmland during the non-growing season to build soil moisture into Pueblo Reservoir, John Martin Reservoir, and other off channel reservoirs around the Lower Arkansas Basin. Changes in river conditions, river administration, and alternatives to agriculture transfer programs may alter the program from its current form of storage for spring irrigation to other uses including municipal and industrial. As a result, the various storage locations of this water may be altered and could affect the historical pattern and reservoir operations throughout the basin.

Description of Task

Task 3.1 Winter Water Storage Program: Operation

This task seeks to understand the key operations of the WWSP and its concepts, components, and administrative constraints. The various decisions that go into each separate ditch or canal company's decision on placement of water and the conditions that cause them to release water will be sought.

Method/Procedure

This task includes understanding the operations of the WWSP from the Division of Water Resources Division 2 Office, Southeastern Colorado Water Conservancy District, and other relevant stakeholders in the WWSP, such as the various canal companies that are members.

This may include meetings with the major WWSP canals that are interested Super Ditch participants.

Deliverable

The results of this task will be a detailed memo describing the operation of the WWSP program, how the various participants operate the program and their constraints.

Description of Task

Task 3.2 Winter Water Storage Program: Data

The WWSP storage and delivery data is fractured and not well consolidated. This task will seek to consolidate the data and better allow the data to be used in future modeling efforts throughout the basin.

Method/Procedure

Pueblo Reservoir is the primary storage location, however a large portion of the water is contained in other storage locations including off-channel irrigation reservoirs and John Martin Reservoir. The additional data not derived from Tasks 1 and 2 may include, for the modeling needs, the amount of supply within each participant's WWSP account in each reservoir during the study period of 1979 through 2009. This data could also include release information and the delivery information to each WWSP participant's canal river headgate during the same study period if the existing data is found to be inaccurate.

Deliverable

The results of this task will be a memo describing the data available for each participant on the available time step at their locations for the modeling. The task will also update datasets for the existing StateMOD model of diversions, storage and release data for the WWSP.

Description of Task

Task 3.3 Winter Water Storage Program: Modeling

The WWSP modeling will be incorporated with the StateMOD model of the Super Ditch operation scenarios. The new data will enable StateMOD to more accurately determine affects of the various conditions that may arise.

Method/Procedure

The model will use the WWSP data to incorporate additional information about the amount of exchangeable yield that can be transferred in that portion of the Arkansas River with modifications to the place of storage, the quantity of storage, and changes to the release pattern of the WWSP water from various reservoirs and examine various demand scenarios. The model will be re-run based upon the updated data and a new result set will be generated.

Deliverable

The result of this task will be StateMOD model runs including a dataset that will incorporate the updated WWSP operations. This task will also include updated results of the analysis.

**Task 4 – Model Operations: Calibration and Optimization**

Once all additional considerations are included in the system model, a detailed calibration and user optimization on the operation of the river, reservoirs, and exchanges needs to be analyzed to conserve the water within the system. The calibration process aims to demonstrate the

model's ability to replicate historical conditions under historical demands and operations. The historical calibration will be assessed based on a comparison of historical data to simulate stream flows, reservoir contents, and diversions. Operational runs and changes will need to be analyzed to incorporate delivery flexibility, reservoir operations, river operations, and to maintain irrigated agriculture in the Lower Arkansas Basin to the highest extent possible.

#### Description of Task

##### Task 4.1 Model Operations: Calibration

As each new module is included in the model, such as WWSP and recovery, additional system calibration will need to be done to ensure an adequate representation of the basin is being made by the model.

#### Method/Procedure

The historical calibration will be assessed based on a comparison of historical data to simulate stream flows, reservoir contents, and diversions. Various input data will be reviewed and modified (typically ditch and irrigated land return flow characteristics and reservoir operations) in order to improve the match of simulation results to historical records on the basis of seasonal variability and annual magnitude. Once the model is calibrated on a monthly time step, it will be run on a daily time step in order to verify the calibrated model and its ability to replicate historical conditions. Modifications of input data may be necessary to improve model simulation output on a daily basis without adversely affecting output generated on a monthly basis.

#### Deliverable

The result of this task will be a memo describing the model results and calibration targets that were achieved. It will also discuss the changes made to the datasets, if any, for calibration improvements.

#### Description of Task

##### Task 4.2 Model Operations: Recovery of Exchangeable Supplies/Operational Scenarios

Super Ditch seeks to understand how the river regime would change under a new use or different operations and seeks to conserve the maximum amount of water while still achieving its delivery goals. The change needs to be quantified relative to how the river would look today absent the new use or different operation, which may be quite different from the historical record. Therefore, the first step in analyzing alternative scenarios is to develop a Baseline dataset as a basis against which to compare future scenarios. Individual changes to the Baseline dataset input files are made and then simulation output from the revised model is compared to the Baseline dataset output to estimate the step-wise changes to river regime, yield, etc. from the change.

#### Method/Procedure

A number of operational scenarios have been identified and it is anticipated others may be identified during this engineering study. The following scenarios will be run initially on a monthly time step followed by model simulations on a daily time step.

- a. Develop Baseline dataset representing current demands, reservoir storage capacities and reservoir and other operational rules. Simulate the Baseline dataset over the historical hydrologic period.



- b. Identify exchange potential through various sub-reaches of the Arkansas River within the Study Area. The output will also be used to represent the recoverable supplies available for other uses.

A result of the StateMOD Lower Arkansas exchange model is that during many months of the irrigation season, the exchange potential within the system limits the amount of projected supply available to exchange from downstream canals, upstream into Pueblo Reservoir. As a result, a large portion of the water is left within the system and is not used for the intended purpose. There are many solutions to recovery of this water that need to be modeled to determine the most appropriate method.

This information about the reservoirs' existing capacity and other information will be derived from the previously funded studies and the analysis in Task 1 above. Other recovery methods may include placing the water into artificial recharge ponds to infiltrate the water into the aquifer and then timing those credits so they are exchanged once they appear in the Arkansas River. Other ideas may be explored to determine the options for the system.

- c. Operate and separately account excess water supplies and recoverable water stored in off-channel reservoirs or artificial recharge ponds during periods with limited to no exchange potential. Operate the supplies as sources of exchange during subsequent time steps when exchange conditions warrant storage of the water in Pueblo Reservoir or other locations.
- d. Modify reservoir operational rules to estimate flexibility and potential efficiencies of the river system under changed input conditions.

#### Deliverable

The results of this task will be a memo describing the model changes and operational model results for the Super Ditch and the amount of water that could be exchanged into Pueblo Reservoir from the lower canals.

### **Task 5 – Engineering and Economic Integration**

This task will integrate the water resources considerations with the economic models to create a holistic plan for the system. This will seek to determine what economic and engineering considerations are applicable to the various scenarios. This task will seek to add the output of the engineering results to the economic models and also attempt integrate economic considerations to the engineering tasks to finalize a Super Ditch operational scenario that fits both the water resources goals with the economic considerations.

#### Description of Task

This task will seek to identify the economic model limitations that need consideration in the scenarios and update the model runs and simulations to account for those changes. This task will incorporate the differences in the models and re-run them with the new limitations to demonstrate a more complete system model of Super Ditch capable of making more accurate decisions on how to best operate the system.

Method/Procedure

The limitations in the economic model will be identified and the corresponding model changes will be created for the StateMOD runs. Once the changes are identified new model runs will be made and updated results set will be created to reflect the economic limitations.

Deliverable

This task will be completed with a memo that describes the considerations for each model and potential ways to address each in the StateMod model. This task will also result in an updated StateMOD model based on the limitations.

**Task 6 – Legal Limitations**

The ability to exchange water into Pueblo Reservoir is limited by a complex array of decrees and agreements, including the Winter Water Storage Program. This task will provide essential input for the engineering work (Tasks 1 – 5) because exchanges into and storage in Pueblo Reservoir and other intermediate storage reservoirs are limited under the WWSP, various court decrees, the Pueblo flow management agreement, and other intergovernmental agreements and contracts.

Description of Task

This task will identify the legal limitations associated with exchanging and/or storing water pursuant to the WWSP into Pueblo Reservoir and other interim reservoirs. This task will involve, among other things, a review of the Winter Water Storage decree and the decrees associated with the underlying water rights, other relevant water court decrees, intergovernmental agreements affecting flows below Pueblo Reservoir, and other relevant intergovernmental agreements and contracts.

Method/Procedure

After review of the relevant decrees, agreements and contracts, and viable options identified from the engineering review, the legal limitations associated with the identified storage options will be analyzed. This will include at least one meeting with Southeastern Colorado Water Conservancy District staff and/or counsel to review and discuss any identified limitations. Any legal limitations will then be incorporated into the engineering model.

Deliverable

This task will be completed with a memorandum that describes the legal considerations and conclusions associated with the WWSP and storage at interim exchange locations. This task may result in changes to the StateMOD model based on the identified legal issues.

**REPORTING AND FINAL DELIVERABLE**

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

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

# Exhibit A

## BUDGET

Provide a detailed budget by task including number of hours and rates for labor and unit costs for other direct costs (i.e. mileage, \$/unit of material for construction, etc.). A detailed and perfectly balanced budget that shows all costs is required for the State's contracting and purchase order processes. Sample budget tables are provided below. Please note that these budget tables are examples and will need to be adapted to fit each individual application. Tasks should correspond to the tasks described above.

	Labor	Matching Funds (If Applicable)	Total Project Costs	WSRA Grant
Task 1.1 - Reservoir Operations: Describe Reservoirs and their Operations	\$49,625.00		\$49,625.00	
Task 1.2 - Reservoir Operations: Model Construction	\$26,855.00		\$26,855.00	
Task 1.3 - Reservoir Operations: Data	\$14,700.00		\$14,700.00	
Task 1.4 - Reservoir Operations: Simulate River Basin Operations to Assure Validity of Model Setup and Input Data	\$13,440.00		\$13,440.00	
Task 2.1 - Pueblo Reservoir: Describe Accounts and Operations	\$27,720.00		\$27,720.00	
Task 2.2 - Pueblo Reservoir: Data	\$18,760.00		\$18,760.00	
Task 2.3 - Pueblo Reservoir: Modeling	\$13,440.00		\$13,440.00	
Task 3.1 - Winter Water Storage Program: Operation	\$10,080.00		\$10,080.00	
Task 3.2 - Winter Water Storage Program: Data	\$14,700.00		\$14,700.00	
Task 3.3 - Winter Water Storage Program: Modeling	\$13,440.00		\$13,440.00	
Task 4.1 - Model Operations: Calibration and Optimization	\$23,520.00		\$23,520.00	
Task 4.2 - Model Operations: Recovery of Exchangeable Supplies /Operational Scenarios	\$23,600.00		\$23,600.00	
Task 5 - Engineering and Economic Integration	\$19,600.00		\$19,600.00	
Task 6 – Legal Limitations	\$10,892.00		\$10,892.00	
In-Kind Contributions				
Total Costs:	\$280,372	\$56,460	\$280,372	\$223,912.00
Other Direct Costs				\$ 1,925.00
WSRA Grant Total				\$225,837.00
*Less Expended				\$105,760.00
WSRA Grant Total				\$120,077.00

Exhibit A

Hours:

	Project Manager	Project Modeler	Project Geologist	Legal	Total
Billing Rate	140	140	135	200	
Task 1.1 - Reservoir Operations: Describe Reservoirs and their Operations	250	90	15		\$ 49,625
Task 1.2 - Reservoir Operations: Model Construction	40	147	5		\$ 26,855
Task 1.3 - Reservoir Operations: Data	55	50			\$ 14,700
Task 1.4 - Reservoir Operations: Simulate River Basin Operations to Assure Validity of Model Setup and Input Data	8	88			\$ 13,440
Task 2.1 - Pueblo Reservoir: Describe Accounts and Operations	88	110			\$ 27,720
Task 2.2 - Pueblo Reservoir: Data	93	41			\$ 18,760
Task 2.3 - Pueblo Reservoir: Modeling	8	88			\$ 13,440
Task 3.1 - Winter Water Storage Program: Operation	60	12			\$ 10,080
Task 3.2 - Winter Water Storage Program: Data	90	15			\$ 14,700
Task 3.3 - Winter Water Storage Program: Modeling	8	88			\$ 13,440
Task 4.1 - Model Operations: Calibration and Optimization	18	150			\$ 23,520
Task 4.2 - Model Operations: Recovery of Exchangeable Supplies/Operational Scenarios	40	90	40		\$ 23,600
Task 5 - Engineering and Economic Integration	90	50			\$ 19,600
Task 6 - Legal Limitations				54	\$ 10,892
Total Hours	848	1019	60	54	
Total Cost	\$ 118,720	\$ 142,660	\$ 8,100	\$ 10,892	\$ 280,372

Exhibit A

Other Direct Costs				
Item:	Mileage	Materials	In-Kind Contributions	Total
Task 1.1 - Reservoir Operations: Describe Reservoirs and their Operations	650			\$357.50
Task 1.2 - Reservoir Operations: Data	250			\$137.50
Task 2.1 - Pueblo Reservoir: Describe Accounts and Operations	500			\$275.00
Task 2.2 - Pueblo Reservoir: Data	500			\$275.00
Task 2.3 - Pueblo Reservoir: Modeling	250			\$137.50
Task 3.1 - Winter Water Storage Program: Operation	250			\$137.50
Task 3.2 - Winter Water Storage Program: Data	250			\$137.50
Task 3.3 - Winter Water Storage Program: Modeling	100			\$55.00
Task 4.1 - System Calibration and Optimization: Opportunities	250			\$137.50
Task 4.2 - Recovery of exchangeable supplies: Recovery Methods	250			\$137.50
Task 5 - Engineering and Economic Integration Task	250			\$137.50
Total Cost:				\$1,925.00
Total Units:	3,500			
Total Cost:			\$385	\$1,925.00

**SCHEDULE**

Provide a project schedule including key milestones for each task and the completion dates or time period from the Notice to Proceed (NTP). This dating method allows flexibility in the event of potential delays from the procurement process. Sample schedules are provided below. Please note that these schedules are examples and will need to be adapted to fit each individual application.

Task	First 6 Months						Second 6 Months					
	1	2	3	4	5	6	7	8	9	10	11	12
1 – Reservoir Operations												
2 – Pueblo Reservoir												
3 – WWSP												
4 – System Calibration and Optimization; Recovery of exchangeable supplies												
5 – Engineering and Economic Integration												
6 – Legal Assistance												
Final Reports												