
Statement of Work

WATER ACTIVITY NAME – SANCHEZ RESERVOIR REHABILITATION
Phase I - Assessment & Upgrade

GRANT RECIPIENT – The Sanchez Ditch and Reservoir Company

FUNDING SOURCE - \$85,000 Statewide Funds; \$10,000 Rio Grande Basin Funds, \$33,160 matching funds

INTRODUCTION AND BACKGROUND – **This first phase of a 4-phase process** addresses issues of human safety, makes infrastructure and operational improvements, and concludes with The Sanchez Ditch and Reservoir Company (SDRC) bringing its entire system into the 21st Century in terms of efficient and precise water management and operational best practices, in preparation for future phases of the Project. The Sanchez system, built around 1910, regulates flows using a unique configuration of a free-standing cylindrical concrete Gate Tower with an 8-sided control room at the top of the tower and inflow gates at various elevations. Access to the control room is via a 100-year-old cable car and tramway. SDRC is making repairs and upgrades to the Gondola per findings of a recent engineering study, improving safety and extending the useful life of this system. With \$95,000 in funding, SDRC will make essential operational and safety repairs and install an automated hydraulic system, thus achieving the State-recommended drawdown capability of 1-foot per day over five days. The configuration of gondola-and-tower will be re-evaluated in the context of the next 50-75 years of operation, with the goal of achieving optimum operational efficiency, thus preserving the multiple benefits of flood control, irrigation, recreation, wildlife and fishery enhancement, and greatly reduced O&M costs.

OBJECTIVES - Ensure the continued safety of SDRC employees; create safe and efficient access to all areas of the Gate Tower; determine the viability of the current tramway-and-tower configuration and identify the best configuration for next 50-75 years of operation; achieve the state-recommended draw-down capability of 1 foot per day; install photovoltaic power and automate essential reservoir operations for remote control; establish systems for capturing, managing, reporting, and tracking

accurate reservoir data; reduce cost of operation and maintenance; and preserve the benefits of flood control, irrigation, recreation, and habitat for wildlife and fishery.

TASK 1 - Evaluate and Upgrade the Gondola & Tramway System - (Matching funds)

Task Description

Tramway Engineering, Ltd. will determine current, short-term, and future functionality the Gondola system; implement safety recommendations for current and near term continued use of the Gondola-Tramway system; and improve safe access to the Gate Tower for repairs, upgrades, and continued operation of Sanchez Reservoir.

Method/Procedure

- a) Mobilize to site
- b) Inspect the cableway, carrier, cables and drive system for the cableway
- c) Analyze data; review the history, operations, maintenance and upgrade options of the cableway
- d) Produce a report that identifies observed safety, operational and maintenance issues
- e) SDRC will implement the recommendations from the Gondola & Tramway report (Appendix D) to increase safety and operation of the Gondola & Tramway, including design and fabrication of a guard system, replacing the wooden deck, replacing bearings and old hardware, and upgrading the bearings, guard system and braking system.

Deliverables

Accomplish needed upgrades and suggested safety modifications in The Tramway Report. Provide estimated potential cost of replacing the current system with a new Gondola system. Meet industry-standard specifications for the upgrade of the Gondola-Cableway system, increasing safety and improving access to the Gate Tower. A Gondola-Tramway report of these repairs and improvements will demonstrate that the Gondola and Tramway System has been brought into compliance with generally accepted standards of operation typically required of industrial/corporate people-moving systems in Colorado. Extend the useful life of this system, allowing for continued safe use as long-term strategies for the Sanchez system are developed and implemented.

TASK 2 – Cylinder Repair and Replacement – (Matching funds)

Task Description:

SDRC will take immediate measures to rehabilitate the cylinder in the lower part of the Gate Tower.

Method/Procedure

Prime Field Service LLC, will:

- a) Remove and repair cylinder & plunger on one 30” gate in the lower part of Gate Tower.

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- b) Fabrication - Re-chrome cylinder; re-chrome plunger packing area
 - c) R.H. Construction will install repaired cylinder, per terms of contract.

Deliverable

Improve ability of SDRC to meet irrigation needs at high levels of reservoir storage and achieve the State's recommended drawdown of 1 foot per day over 5 days. Restore full function of hydraulic cylinder. This will improve the ability of SDRC to more efficiently store and release water for irrigation, improve flood control capabilities, maintain dam safety requirements, and reduce maintenance expense.

TASK 3 – Replace & Automate Hydraulic Activation System:

Description of Task

Prime Machine, Inc. will remove existing hydraulic activation system and install a new hydraulic activation system, coordinating with Colorado Digital Labs, which will design and install automated and remote control systems. This Task will be accomplished by collaboration between both companies to achieve the objectives of SDRC, secured by installing “vandal-proofing” security systems.

Method/Procedure

Prime Machine, Inc will:

- a) Mobilize at Prime Machine shop and at Sanchez Reservoir - Install new 90-foot ladder and safety harnesses to facilitate installation.
- b) Hydraulic Operators - Remove old hydraulic system; coordinate with Colorado Digital Labs for electronic automation & remote control; engineer new hydraulic system and produce schematics.
- c) Install new hydraulic system with motor and RAMs. Collaborate with Colorado Digital Labs to Provide on-site training on the operation of the new hydraulic system. Coordinate with Colorado Digital Labs to create on-site Users Manual for the new hydraulic system.
- d) Demobilize

Colorado Digital Labs, Inc. will:

- e) Establish Intentions - Determine future SDRC demand for electricity at the Tower - Determine automation goals, operational requirements and documentation needs
- f) Conceptual design of overall system – how it works, what it will do. Electrical and electronic designs will be developed in collaboration with Prime Machine.
- g) Assess feasibility based on location, infrastructure, seasonal considerations, solar, etc.
- h) Design Integration - Establish design requirements; integrate Prime Machine hydraulics, communication, solar power system
- i) Preliminary Design -- Develop preliminary design in conjunction with Prime Machine hydraulic system; review with SDRC.
- j) Develop and deliver detailed final design to SDRC obtaining sign-off as final approval.

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- k) Production Plan - Work with Prime Machine to coordinate production, installation
 - l) Solar components & software development - Install solar power system, working with SDRC for vandalism prevention and with Prime Machine for control systems. Complete component acquisition, system production, software development
 - m) Install all systems, timed to interface with other contractors, seasonal considerations, etc.
 - n) Create User Manual for automated system, interfacing with Prime Machine; test and calibrate systems; verify performance over first 60 days of operation; maintenance contract options.

SDRC will install protective shields, limit access, establish remote alarm systems, and work with Prime Machine and Colorado Digital Labs to protect all installed systems from environmental damage and human vandalism.

Deliverable

A new hydraulic operator system is installed, designed to be operated manually on site as well as by remote electronic controls from the office of SDRC, with automated controls developed in collaboration with Colorado Digital Labs, Inc.

Achieve operation and data management objectives defined by SDRC for the remote operation, data collection, and reservoir management of Sanchez Reservoir. All systems will be in place, tested, and fully operational, with security systems in place to protect these installations. This will enable SDRC to operate the Sanchez system with precise and efficient water management and to implement reservoir best management practices.

Task 4 – Evaluate Long- term Viability of Present Gondola/Tower Configuration vs. Alternatives

Description of Task

SDRC will evaluate the current configuration of gate tower and cable-car in terms of current, continued, and long term operational viability, determining the best means of upgrading the existing system or, if keeping it is deemed not advisable, identifying the best available alternative to provide ease of access to and efficient operation of the reservoir. Consideration will be given in each alternative to the potential viability of a micro-hydro installation. SDRC has secured a proposal to perform this evaluation from Smith Geotechnical Engineering Consultants, the engineering firm which has worked on the reservoir in past years.

Method/Procedure

Smith Geotechnical Engineering Consultants will survey and assess current and projected condition of the Gate Tower, outlet control system, and gates to determine long term viability of the current configuration, and evaluate potential alternative operational systems, including potential for generating micro-hydropower.

- a) Site visit – Engineer will inspect the Tower

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- b) Project Engineer will determine Repair/Replacement alternatives, and feasibility of a micro-hydro installation, presenting conclusions in text/graphic format.
 - c) Prepare Cost estimates and analyses for each alternative
 - d) Prepare Economic Analysis of various alternatives
 - e) Complete feasibility study and deliver Final Report, including preliminary projections relating to the potential for micro-hydropower.

Deliverable

The Final Report will provide the Board of Directors of SDRC with a sound basis for making a decision with regard to the type of reservoir outlet best suited for the future.

TASK 5 – Supervision, Administration, & Final Report

Task Description – Throughout all of Phase I of this Project, SDRC will be directly responsible, functioning as the general contractor for all Tasks. Invoices, reports, reimbursements, and the final report will be processed.

Method/Procedure – Supervise all tasks, accompany crews to the Tower, govern coming and going and traffic, complete paperwork and keep books, avoid unnecessary delays, ensure safety, troubleshoot issues as they arise. All reporting will meet CWCB specifications and guidelines, per paragraph below.

Deliverable – Completion of Phase 1, with all tasks completed safely, on schedule, and within or under budget.

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.

SCHEDULE

		N T P	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13
Gondola Study															
Gondola Upgrade															
Cylinder Replacement															
Hydraulic System															
Solar Electric, Automation & Security															
Gondola – Tramway Feasibility															
Supervision, Admin, Final Report															

PAYMENT

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

BUDGET						
	RATE	LABOR	DIRECT	MATCH	GRANT	TOTAL
Task 1 - Evaluate/Upgrade Gondola & Tramway						
a) Mobilization & travel	\$120/hr X 12		\$ 1,440			
b) Inspect	\$150/hr X 6	\$ 900				
c) Analysis	\$133/hr X 8	\$ 1,060				
d) Produce Report	\$150/hr X 8	\$ 1,200				
Sub total - Tramway Engineering		\$ 3,160	\$ 1,440	\$ 4,600		
e) Gondola/Tramway Upgrades						
Design & fabricate guard system	\$30/hr X 160 X 3	\$ 14,400				
Replace wooden deck						
Replace bearings, old hardware						
Bearings, guard system, braking system			\$ 8,000			
Subtotal - SDRC		\$ 14,400	\$ 8,000	\$ 22,400		
TASK 1 TOTAL		\$ 17,160	\$ 9,440	\$ 27,000		\$ 27,000
Task 2 - Cylinder Repair and Replacement						
a) Remove & Repair Cylinder & Plunger	set price		\$ 4,800			
b) Fabrication	\$50/hr X 8 X 2	\$ 800				
c) R.H Construction Installation	\$35/hr X 8 X 2	\$ 560				
TASK 2 TOTAL		\$ 1,360	\$ 4,800	\$ 6,160		\$ 6,160
Task 3 - Replace, Automate Hydraulics, Security						
3.1 Hydraulic Operators - Prime Machine						
a) Mobilization	unit price		\$ 3,631			
b) Hydraulic Operators		\$ 9,000				
c) Installation	\$85/hr X 285	\$ 24,249				
b) Demobilization	unit price		\$ 3,120			
Subtotal - Prime MachineL		\$ 33,249	\$ 6,751		\$ 40,000	
3.2 Solar System & SCADA - Colorado Digital Labs						
e) Establish intentions	\$75/hr X 8	\$ 600				
f) Conceptual design	\$75/hr X 8	\$ 600				
g) Feasibility issues	\$75/hr X 4	\$ 300				
h) Design integration	\$75/hr X 20	\$ 1,500				
i) Preliminary design	\$75/hr X 16	\$ 1,200				
j) Detail & final design	\$75/hr X 40	\$ 3,000				
k) Production plan	\$75/hr X 10	\$ 750				
l) Components, Software devel.	\$75/hr X 60	\$ 4,500	\$ 11,450			
m) Installation -	\$40/hr X 23	\$ 920	\$ 880			
n) User Manual, calibration, 60 day support	\$75/hr X 16	\$ 1,200				
Subtotal - Colorado Digital Labs		\$ 14,570	\$ 12,330		\$ 26,900	
3.3 Vandal-Proofing Installations Total (SDRC)		\$ 5,000			\$ 5,000	
TASK 3 TOTAL		\$ 52,819	\$ 19,081			\$ 71,900
Task 4 - Feasibility of Configuration - Smith Geo.						
a) Engineer - Tower Inspection	unit price	\$ 960				
b) Repair/Replace Alternatives						
Project Engineer	\$100/hr X 50	\$ 5,000				
CADD Operator	\$70/hr X 8	\$ 560				
c) Cost Analysis						
Project Engineer	\$100/hr X 16	\$ 1,600				
CADD Operator	\$70/hr X 4	\$ 280				
d) Economic Analysis						
Project Engineer	\$100/hr X 8	\$ 800				
Project Manager	\$125/hr X 4	\$ 500				
e) Final Report w/Micro -Hydro Feasability	\$125/hr x 20	\$ 2,500				
Project Engineer	\$100/hr X 8	\$ 800				
Project Manager	\$125/hr X 4	\$ 500				
Task 4 Total		\$ 13,500			\$ 13,500	\$ 13,500
Task 5 - SDRC Administration & Final Report	\$30/hr X 160 X 2	\$ 9,600			\$ 9,600	\$ 9,600
TOTAL MATCHING FUNDS				\$ 33,160		
TOTAL WSRA GRANT FUNDS					\$ 95,000	
PROJECT TOTAL						\$ 128,160