STATE OF COLORADO INTERAGENCY AGREEMENT

COVER PAGE

Paying State Agency	Agreement Numbers			
Department of Natural Resources	CMS 170660			
Colorado Water Conservation Board (CWCB)	CTGG1 2022-2096			
1313 Sherman St, Room 718				
Denver, CO 80203				
Performing State Agency	Agreement Performance Beginning Date			
Colorado State University	The later of the Effective Date (the date the State Controller			
	or an authorized delegate signs this Grant Agreement) OR			
	09/01/2021.			
Agreement Maximum Amount	Agreement Expiration Date			
\$157,384.00	06/30/2026			
Local Match Agreement Authority				
\$157,384.00	2018 CWCB projects bill, SB18-218, section 11,			
	Implementation of the Colorado Water Plan Appropriation.			

Agreement Purpose

Improving irrigation efficiency through the development of the hydraulic infrastructure at Irrigation Innovation Consortium (IIC) Headquarters

The IIC at CSU is partnering with CSU's Agricultural Research, Development, and Education Center (ARDEC) to improve irrigation research capacity at the research farm located in Northeast Fort Collins by upgrading and developing the hydraulic infrastructure at CSU-ARDEC. The IIC will use the improved hydraulic infrastructure for research and demonstration of irrigation technologies.

Exhibits and Order of Precedence

The following Exhibit(s) and attachment(s) are included with this Agreement:

- 1. Exhibit A Statement of Work.
- 2. Exhibit B Budget and Schedule

In the event of a conflict or inconsistency between this Agreement and any Exhibit or attachment, such conflict or inconsistency shall be resolved by reference to the documents in the following order of priority:

- 1. The provisions of the main body of this Agreement.
- 2. Exhibit A, Statement of Work.
- 3. Exhibit B Budget and Schedule

Principal	Representative	S
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For the Paying State Agency: For the Performing State Agency:

Alex Funk Timothy Martin

Colorado Water Conservation Board Colorado State University, Office of Sponsored Programs

1313 Sherman St. Room 718 2002 Campus Delivery
Denver, CO 80203 Fort Collins, CO 80523-2002

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alex.funk@state.co.us timothy.martin@colostate.edu

SIGNATURE PAGE

THE PARTIES HERETO HAVE EXECUTED THIS AGREEMENT

Each person signing this Agreement represents and warrants that the signer is duly authorized to execute this Agreement and to bind the Party authorizing such signature.

STATE OF C	OLORADO				
Jared S. Polis, Governor					
Department of Natural Resources Colorado Water Conservation Board By:	THIS. SOUNDE TO SEE TO				
In accordance with §24-30-202, C.R.S., this Agreement is not valid until signed and dated below by the State Controller or an authorized delegate. STATE CONTROLLER Robert Jaros, CPA, MBA, JD					
By: low Cotsapas 70E3DF1B09EE4E8 August 13, 2021 9:23 AM MDT Effective Date:					

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1. PARTIES

This Interagency Agreement (this "Agreement") is entered into by and between the Paying Agency, (the "Paying Agency"), and the Performing Agency, (the "Performing Agency") who are named on the Cover Page of this Agreement. The Paying Agency and the Performing Agency may each individually be referred to as a "Party" and collectively as the "Parties." Each Party is an agency of the STATE OF COLORADO, hereinafter called the "State."

2. TERM AND EFFECTIVE DATE

A. Effective Date

This Agreement shall not be valid or enforceable until the Effective Date.

B. Term

The Parties' respective performances under this Agreement shall commence on the Agreement Performance Beginning Date shown on the Cover Page for this Agreement and shall terminate on the Agreement Expiration Date shown on the Cover Page for this Agreement unless sooner terminated or further extended in accordance with the terms of this Agreement.

C. Termination for Convenience

Either Party may terminate this Agreement for convenience by giving the other Party 90 days prior written notice setting forth the date of termination.

3. STATEMENT OF WORK AND BUDGET

A. Work

The Performing Agency shall complete the Work as described in this Agreement and in accordance with the provisions of Exhibit A. The Paying Agency shall have no liability to

compensate the Performing Agency for the delivery of any goods or the performance of any services that are not specifically set forth in this Agreement.

B. Goods and Services

The Performing Agency shall procure goods and services necessary to complete its obligations using Agreement funds and shall not increase the maximum amount payable hereunder by the Paying Agency.

4. PAYMENTS TO THE PERFORMING AGENCY

A. Maximum Amount

Payments to the Performing Agency are limited to the unpaid, obligated balance of the Agreement funds. The Paying Agency shall not pay the Performing Agency any amount under this Agreement that exceeds the Agreement Maximum Amount for that State Fiscal Year shown on the Cover Page for this Agreement.

B. Payment Procedures

- i. The Performing Agency shall initiate payment requests by invoice to the Paying Agency, in a form and manner approved by the Paying Agency. To facilitate Fiscal Year End closing, final invoices for each Fiscal Year should be submitted to the Paying Agency by July 15th of the following Fiscal Year.
- ii. The Paying Agency shall pay each invoice within 30 days following the Paying Agency's receipt of that invoice, so long as the amount invoiced correctly represents work completed by the Performing Agency and previously accepted by the Paying Agency during the term that the invoice covers.
- iii. In accordance with the Fiscal Procedures Manual, each Agency shall report the outstanding balance of this Agreement on Exhibit AR_AP at Fiscal Year end.

5. RECORDS, MAINTENANCE AND INSPECTION

A. Maintenance

During the term of this Agreement and for a period terminating upon the later of (i) the six year anniversary of the final payment under this Agreement or (ii) the resolution of any pending Agreement matters (the "Record Retention Period"), each Party shall maintain, and allow inspection and monitoring by the other Party, and any other duly authorized agent of a governmental agency, of a complete file of all records, documents, communications, notes and other written materials, electronic media files, and communications, pertaining in any manner to the work or the delivery of services or goods hereunder.

B. Inspection

The Paying Agency shall have the right to inspect the Performing Agency's performance at all reasonable times and places during the term of this Agreement. The Performing Agency shall permit the Paying Agency, and any other duly authorized agent of a governmental agency having jurisdiction to monitor all activities conducted pursuant to this Agreement, to audit, inspect, examine, excerpt, copy and/or transcribe the Performing Agency's records related to this Agreement during the Record Retention Period to assure compliance with the terms hereof or to evaluate performance hereunder. Monitoring activities controlled by the

Paying Agency shall not unduly interfere with the Performing Agency's performance hereunder.

6. CONFIDENTIAL INFORMATION

Each Party shall treat the confidential information of the other Party with the same degree of care and protection it affords to its own confidential information, unless a different standard is set forth in this Agreement. Each Party shall notify the other Party immediately if it receives a request or demand from a third party for records or information of the other Party.

7. DISPUTE RESOLUTION

The failure of a Party to perform its respective obligations in accordance with the provisions of this Agreement is a breach of this Agreement. In the event of disputes concerning performance hereunder or otherwise related to this Agreement, the Parties shall attempt to resolve them at the divisional level. If this fails, disputes shall be referred to senior departmental management staff designated by each Party. If this fails, the executive director of each Party shall meet and attempt resolution. If this fails, the matter shall be submitted in writing by both Parties to the State Controller, whose decision shall be final.

8. NOTICES AND REPRESENTATIVES

Each individual identified as a Principal Representative on the Cover Page for this Agreement shall be the Principal Representative of the designating Party. All notices required or permitted to be given under this Agreement shall be in writing, and shall be delivered (**A**) by hand with receipt required, (**B**) by certified or registered mail to such Party's Principal Representative at the address set forth on the Cover Page or (**C**) as an email with read receipt requested to the Principal Representative at the email address, if any, set forth on the Cover Page for this Agreement. Either Party may change its Principal Representative by notice submitted in accordance with this section without a formal amendment to this Agreement. Unless otherwise provided in this Agreement, notices shall be effective upon delivery of the written notice.

9. GENERAL PROVISIONS

A. Assignment

The Performing Agency's rights and obligations under this Agreement are personal and may not be transferred or assigned without the prior, written consent of the Paying Agency. Any attempt at assignment or transfer without such consent shall be void. Any assignment or transfer of the Performing Agency's rights and obligations approved by the Paying Agency shall be subject to the provisions of this Agreement.

B. Counterparts

This Agreement may be executed in multiple, identical, original counterparts, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same agreement.

C. Digital Signatures

If any signatory signs this Agreement using a digital signature in accordance with the Colorado State Controller Contract, Grant and Purchase Order Policies regarding the use of digital signatures issued under the State Fiscal Rules, then any agreement or consent to use

digital signatures within the electronic system through which that signatory signed shall be incorporated into this Agreement by reference.

D. Third Party Beneficiaries

Except for the Parties' respective successors and assigns, this Agreement does not and is not intended to confer any rights or remedies upon any person or entity other than the Parties. Enforcement of this Agreement and all rights and obligations hereunder are reserved solely to the Parties. Any services or benefits which third parties receive as a result of this Agreement are incidental to this Agreement, and do not create any rights for such third parties.

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Colorado Water Conservation Board

Water Plan Grant - Exhibit A

Statement Of Work				
Date:	July 13, 2021			
Name of Grantee:	Colorado State University			
Name of Water Project:	Improving irrigation efficiency through the development of the hydraulic infrastructure at Irrigation Innovation Consortium (IIC) Headquarters			
Funding Source:	Colorado State University (CSU) and CO Water Plan Grant			

Water Project Overview:

The Irrigation Innovation Consortium (IIC) began in 2018 as a collaboration of five land grant universities, led by Colorado State University (CSU), and has since added multiple industry partners in becoming a center of excellence promoting water and energy efficiency in irrigation. The IIC mission fosters resiliency in our irrigated food and landscape systems by accelerating development and adoption of water and energy efficient irrigation technologies and practices through public-private partnerships. The IIC governance structure can be found online at https://irrigationinnovation.org/about/governance-structure/. The IIC is midway through a 5 year, \$5M grant from the Foundation for Food and Agriculture Research (FFAR) with another \$5M match in cash, services and equipment from partner organizations. The IIC is becoming selfsustaining via additional partnerships, research projects and other donations and collaborations. The IIC at CSU is partnering with CSU's Agricultural Research, Development, and Education Center (ARDEC) to improve irrigation research capacity at the research farm located in Northeast Fort Collins by upgrading and developing the hydraulic infrastructure at CSU-ARDEC. The IIC will use the improved hydraulic infrastructure for research and demonstration of irrigation technologies. The IIC will leverage the improved irrigation research capacity at ARDEC to foster private-public partnerships for furthering advancements in irrigation research, education, and extension in CO, the U.S., and across the globe, Water Plan Grant (WPG) funding will support the improvement of irrigation research capacity at ARDEC. This project will be performed from 9/1/2021 thru 6/30/2026.

The purpose of this grant application is to improve the irrigation infrastructure at CSU-ARDEC for conducting applied irrigation research and IIC outreach activities. Some defined outcomes of the IIC include:

- Technology Development Focus: As an incubator of ideas for new and improved irrigation hardware, software, remote sensing applications and decision support systems where private companies work collaboratively with researchers in a precompetitive environment.
- Fill Research Gaps: Close university partnership with industry and government agencies has the greatest potential to propel irrigation science and technology forward into practical and fundamental applications.
- Pre-Competitive Space: The five founding university partners, along with USDA-ARS, provide a broad array of test and demonstration sites at their Experiment Station farms and university laboratories where applied irrigation research is currently underway.
- Demonstration and Training: The IIC provides irrigation practitioners with opportunities for handson evaluation of new technology before adoption. The IIC has a network of coordinated multi-state sites where irrigators can evaluate and be trained on new irrigation equipment and technology.



- Investment through Partnership: The IIC is bringing multiple partners together behind a common goal. Industry partners are key drivers of the Consortium and provide technology transfer for commercialization of new technologies.
- Public Benefit, Public Results: The Land Grant system and public universities develop knowledge for the benefit of all citizens and stakeholders. IIC's outreach emphasis will be represented in programs, as will our distance education offices.

The IIC's prioritized focus areas are: i) Water and Energy efficiency; ii) Remote Sensing and Big Data Applications for Improving Irrigation Water Management; iii) System Integration and Management; iv) Irrigation Technology Acceleration and Technology Transfer.

The current project proposal addresses the modernization of hydraulic structures and irrigation systems at CSU-ARDEC to develop the capability of IIC at CSU to carry on innovative and collaborative irrigation efficiency and conservation research, education, training, and outreach activities.

Project Objectives:

- 1. Improve the irrigation research capacity of CSU and IIC through upgrades and development of the hydraulic infrastructure at CSU-ARDEC (Fort Collins, Colorado).
 - a. Retrofit an existing linear move sprinkler system (30 acres) for variable rate irrigation (VRI).
 - b. Upgrade the sprinkler system of an existing turf grass field to serve as a reference crop (clipped grass) plot for on-site monitoring of reference crop evapotranspiration (ET₀).
 - c. Retrofit an existing check structure and install a Rubicon PikoMeter ® (head gate) in the North Poudre Irrigation lateral that supplies surface water to ARDEC.
 - d. Rehabilitate existing (40-year old) well equipment to improve pump efficiency and reliability.
- **2.** Test the improved irrigation infrastructure for compliance with design specifications and prepare the systems for use in irrigation research, education, training, and outreach activities.



Tasks

Task 1 - Retrofit linear move sprinkler system for VRI

Description of Task:

An existing linear move sprinkler system that irrigates 30 acres at ARDEC will be retrofitted with new sprinklers, valves, and controller for conversion into a variable rate irrigation (VRI) system. The pump that supplies the linear move will be retrofitted with a variable frequency drive (VFD) to enable dynamic adjustments to the pump speed with varying irrigation rates.

Method/Procedure:

CSU/IIC will hire a linear move sprinkler dealer to prepare the hydraulic design of the VRI system for the existing linear move. The dealer will install the new sprinklers, valves, controller, and VFD. CSU/IIC will test the VRI system to assure compliance with design specifications.

Deliverable:

- Hydraulic design of VRI system
- Functional VRI linear move sprinkler system

Tasks

Task 2 - Upgrade sprinkler system for a grass reference ET₀ station

Description of Task:

ARDEC-South needs on-site monitoring of grass reference crop ET (ET $_{\rm o}$) for estimation of local crop consumptive water use (ET $_{\rm c}$). The American Society of Civil Engineers (ASCE, 2005) recommends that an automatic weather station (AWS) used for calculating ET $_{\rm o}$ be located in the middle of a field with <u>irrigated</u> vegetation, such as clipped grass. Given that the intended ET $_{\rm o}$ plot at ARDEC-South will be surrounded by other irrigated fields, it is estimated that around 1.0 acre of an exisiting turf grass area will be adequate to surround an AWS that will be used for ET $_{\rm o}$ calculations. The solid set sprinkler system of approximately 1 acre of existing turf grass will be upgraded with new sprinklers and water lines that will be used to maintain fully irrigated conditions for a grass reference station.

ASCE-EWRI. (2005). The ASCE Standardized Reference Evapotranspiration Equation. Report 0-7844-0805-X, ASCE Task Committee on Standardization of Reference Evapotranspiration. Reston, Va.: American Soc. Civil Engineers.

Method/Procedure:

A solid set sprinkler irrigation system (donated by Toro Company) will be installed on approximately 1 acre of existing turf grass. A sprinkler irrigation contractor will be hired to install the system. A flow sensor and an irrigation controller will be installed for smart scheduling of irrigations. A sprinkler line blow out assembly will be installed for flushing and winterization. After the solid set sprinkler system is upgraded, the system will be tested for programmed irrigation scheduling of the turf grass. An existing AWS will be transferred to the middle of the grass field for automated monitoring of solar radiation, air temperature, relative humidity, and wind speed that are required for calculation of hourly (mm/h) and daily (mm/d) ASCE standardized ETo.



Tasks

Deliverable:

- Upgraded solid set sprinkler system for irrigating a 1-acre grass reference plot
- Grass reference (ET_o) field for monitoring weather variables required for calculating hourly and daily ET_o.
- Report of irrigation system operation

Tasks

Task 3 - Installation of automated head gate

Description of Task:

CSU/IIC will work with Rubicon ™ to retrofit an existing check structure that regulates the water level and flow through the North Poudre Irrigation lateral that supplies ARDEC. The existing head gate is manually operated and does not have automated flow measurement. The existing head gate will be replaced with a state-of-the-art automated head gate with precise flow measurement capabilities.

Method/Procedure:

Permission from North Poudre Irrigation Company will be obtained before retrofitting activities begin. Rubicon will provide specifications for the necessary concrete work to fit a donated Rubicon PikoMeter® gate capable of remotely delivering precisely measured quantities of surface water to ARDEC. Once approval has been obtained, concrete work and attachment of the PikoMeter will be performed.

Deliverable:

Automated head gate (Rubicon PikoMeter) that delivers precise amounts of surface water to ARDEC.

Tasks

Task 4 - Rehabilitation of groundwater well

Description of Task:

An existing well at ARDEC South that supplies water to the linear move sprinkler system (Task 1) and the turf grass (Task 2) will be rehabilitated to improve groundwater flow and pump efficiency.

This project will improve the efficiency and reliability of irrigation water supplies: i) West Well (Well #3) was registered in 1960 with a yield of 1,100 GPM. The well equipment is approximately 40 years of age, with a depth of approximately 33 feet. East Well (Well #5) was registered in 1960 with a yield of 600 GPM. The well equipment is approximately 40 years of age, with a depth of approximately 35 feet.

Method/Procedure:



Tasks

CSU Facilities Management will replace the existing well casing and lining, pump, motor, electric feed, and electrical gear. The well will be re-developed by fracturing the groundwater formation to improve water flow into the well.

Deliverable:

• Rehabilitated well with improved pump efficiency, flow capacity, and reliability.

Tasks

Task 5 - Project management

Description of Task:

To oversee and coordinate on-site construction, A.J. Brown, Assistant Director of the IIC and employee of CSU, will spend 2.42 months of his time for this project. His services will include coordination with ARDEC and CSU Facilities personnel, communication with contractors, and testing of the upgraded hydraulic infrastructure. The principal investigator (PI, Dr. Allan Andales) will spend 0.12 month of time to manage the grant funds and give progress reports to CWCB. The Co-PI (Dr. José L. Chávez) will spend 0.12 month of time providing technical advice in the retrofitting and testing of the sprinkler systems.

Method/Procedure:

A.J. Brown will coordinate with ARDEC and CSU Facilities personnel, communication with contractors, and test the upgraded hydraulic infrastructure and grass reference ET₀ station. The Co-PI (Dr. José L. Chávez) will provide technical advice in the retrofitting and testing of the sprinkler systems. The PI (Dr. Allan Andales) will manage the grant funds and give progress reports to CWCB.

After completion of the one-year CWCB project, the improved hydraulic infrastructure at ARDEC will continue to be used as research, demonstration, and education tools to advance and promote adoption of efficient irrigation technologies among agricultural irrigators and water managers in Colorado and beyond.

Deliverable:

- Completion of Tasks 1 to 4
- Progress and Final reports to CWCB.

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

The Budget and Schedule are provided in Exhibit B.



Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status 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 Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions.

Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to CWCB in hard copy and electronic format as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:

- (a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.
- (b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment.
- (c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary.
- (d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.



Colorado Water Conservation Board

Water Plan Grant - Exhibit B Budget and Schedule

Name of Grantee: Colorado State University

Name of Water Project: Developing hydraulic infrastructure at CSU-ARDEC to support innovative research in irrigation

efficiency, water use, and re-use

Project Start Date: 09/1/2021

Project End Date: 06/30/2026

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Retrofit linear move sprinkler system for VRI	9/1/2021	6/30/2026	\$86,000	\$0	\$86,000
2	Upgrade sprinkler system for a grass reference ETo station	9/1/2021	6/30/2026	\$26,500	\$0	\$26,500
3	Installation of automated head gate	9/1/2021	6/30/2026	\$6,000	\$0	\$6,000
4	Rehabilitation of groundwater well	9/1/2021	6/30/2026	\$0	\$136,856	\$136,856
5	Project management	9/1/2021	6/30/2026	\$18,356	\$0	\$18,356
6	Facilities and Administration	9/1/2021	6/30/2026	\$20,528	\$20,528	\$41,057
			Total	\$157,384	\$157,384	\$314,768

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