COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Last Updated: June 2020

Colorado Water Conservation Board

Water Plan Grant Application

Instructions

To receive funding for a Water Plan Grant, applicant must demonstrate how the project, activity, or process (collectively referred to as "project") funded by the CWCB will help meet the measurable objectives and critical actions in the Water Plan. Grant guidelines are available on the CWCB website.

If you have questions, please contact CWCB at (303) 866-3441 or email the following staff to assist you with applications in the following areas:

Water Storage Projects	Matthew.Stearns@state.co.us
Conservation, Land Use Planning	Kevin.Reidy@state.co.us
Engagement & Innovation Activities	Ben.Wade@state.co.us
Agricultural Projects	Alexander.Funk@state.co.us
Environmental & Recreation Projects	Chris.Sturm@state.co.us

FINAL SUBMISSION: Submit all application materials in one email to *waterplan.grants@state.co.us*
in the original file formats [Application (word); Statement of Work (word); Budget/Schedule (excel)]. Please do not combine documents. In the subject line, please include the funding category and name of the project.

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Water Project Summary	
Name of Applicant	Allan A. Andales
Name of Water Project	Developing irrigation infrastructure at CSU-ARDEC to support innovative research in irrigation efficiency, water use, and re-use
CWP Grant Request Amount	$588,246
Other Funding Sources _____	$
Other Funding Sources _____	$
Other Funding Sources _____	$
Applicant Funding Contribution	$588,246
Total Project Cost	$1,176,492

Applicant & Grantee Information
Name of Grantee(s): Colorado State University
Mailing Address: Office of Sponsored Programs; 2002 Campus Delivery, Fort Collins, CO 80523-2002
FEIN: 846000545
Organization Contact: Catherine Douras
Position/Title: Senior Research Administrator
Email: Catherine.douras@colostate.edu
Phone: 970-491-2375
Grant Management Contact
Position/Title: Catherine Douras/Senior Research Administrator
Email: Catherine.douras@colostate.edu
Phone: 970-491-2375

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Name of Applicant: Allan A. Andales (if different than grantee)
Mailing Address: 1170 Campus Delivery, Fort Collins, CO 80523-1170
Position/Title: Professor
Email: Allan.Andales@colostate.edu
Phone: 970-491-6516

Description of Grantee/Applicant
Provide a brief description of the grantee's organization (100 words or less).
Colorado State University is recognized as one of the premier research institutions and routinely ranks in the top of all-American Universities in research expenditures. The Office of the Vice President for Research has overall responsibility for facilitating the research enterprise at CSU. The Office works to encourage and support the development, marketing and application of CSU's intellectual property and our world-renowned researchers, students and facilities. The Office will lead the 21st Century Land-Grant mission of CSU by fostering and supporting the research enterprise, promoting scholarship and artistry, instilling a culture of integrity, and capitalizing on opportunities to address global challenges.

Type of Eligible Entity (check one)	
X	**Public (Government):** Municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.
	Public (Districts): Authorities, Title 32/special districts (conservancy, conservation, and irrigation districts), and water activity enterprises.
	Private Incorporated: Mutual ditch companies, homeowners associations, corporations.
	Private Individuals, Partnerships, and Sole Proprietors: Private parties may be eligible for funding.
	Non-governmental organizations (NGO): Organization that is not part of the government and is non-profit in nature.
	Covered Entity: As defined in Section 37-60-126 Colorado Revised Statutes.

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Type of Water Project (check all that apply)	
	Study
X	Construction
	Identified Projects and Processes (IPP)
X	Other: Project demonstration and outreach

Category of Water Project (check the primary category that applies and include relevant tasks)		
	Water Storage - Projects that facilitate the development of additional storage, artificial aquifer recharge, and dredging existing reservoirs to restore the reservoirs' full decreed capacity and Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap. *Applicable Exhibit A Task(s):*	
	Conservation and Land Use Planning - Activities and projects that implement long-term strategies for conservation, land use, and drought planning. *Applicable Exhibit A Task(s):*	
	Engagement & Innovation - Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website. *Applicable Exhibit A Task(s):*	
X	Agricultural - Projects that provide technical assistance and improve agricultural efficiency. *Applicable Exhibit A Task(s): 1 to 6*	
	Other	Explain:

Location of Water Project	
Please provide the general county and coordinates of the proposed project below in **decimal degrees**. The Applicant shall also provide, in Exhibit C, a site map if applicable.	
County/Counties	Larimer
Latitude	40.6528
Longitude	-104.9997

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Water Project Overview
Please provide a summary of the proposed water project (200 words or less). Include a description of the project and what the CWP Grant funding will be used for specifically (e.g., studies, permitting process, construction). Provide a description of the water supply source to be utilized or the water body affected by the project, where applicable. Include details such as acres under irrigation, types of crops irrigated, number of residential and commercial taps, length of ditch improvements, length of pipe installed, and area of habitat improvements, where applicable. If this project addresses multiple purposes or spans multiple basins, please explain. The Applicant shall also provide, in Exhibit A, a detailed Statement of Work, Budget, Other Funding Sources/Amounts and Schedule.
CWP grant funding will support the development of electrical, hydraulic, and network infrastructure necessary to support the Irrigation Innovation Consortium (IIC) and the Colorado State University Agricultural Research Development and Education Center (CSU-ARDEC) in pursuing cutting-edge research in the areas of irrigation and energy efficiency, and irrigation water use and reuse in food safety. The CWP funding will develop and implement a Testing Ag Performance Solutions (TAPS) research and engagement program, expanding the footprint first established by University of Nebraska-Lincoln in North Platte, NE, and replicated recently by Oklahoma State University in the OK Panhandle in Eva. This CWP grant will expand IIC's research and demonstration capacity at CSU to the CSU-ARDEC, allowing greater internal and external collaboration and support for irrigation research, education and extension activities. This project will integrate with the wells rehabilitation program to be conducted at ARDEC during 2021-22. ARDEC is composed of about 996 acres of cropland that is irrigated by well water, with some lands also irrigated by surface water rights, for CSU research, education, and extension. Crops grown at ARDEC include, corn, alfalfa, wheat, dry beans, vegetable crops, hemp, specialty crops and pasture grass. Each irrigation well is specifically decreed for both use and land on which the water can be used, with senior water rights that make them priceless. CSU moved to the site in 1993, reusing much of the existing farm infrastructure dating from the 1950-1960s. The irrigation well "parts" and infrastructure are 40-60 years old and in need of refurbishment to improve water flow and prevent complete failure.

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Measurable Results

To catalog measurable results achieved with the CWP Grant funds, please provide any of the following values as applicable:

~1 acre/ft.	New Storage Created (acre-feet)	
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive	
	Existing Storage Preserved or Enhanced (acre-feet)	
	Length of Stream Restored or Protected (linear feet)	
~30acre-ft	Efficiency Savings (indicate acre-feet/year OR dollars/year)	
	Area of Restored or Preserved Habitat (acres)	
	Quantity of Water Shared through Alternative Transfer Mechanisms	
	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning	
200	Number of Coloradans Impacted by Engagement Activity	
X	Other	Explain: • Construction of two additional irrigation water storage ponds with new pumps • Upgrade of linear move sprinkler to fully automated, variable rate, research grade machine • Design and installation of subsurface drip in 1.53 designated acres • Installation of side roll irrigation system on 8.4 acres • Installation of all water pipeline • Design and installation of electrical infrastructure to deliver power to all irrigation system components

Water Project Justification

Provide a description of how this water project supports the goals of Colorado's Water Plan, the most recent Statewide Water Supply Initiative, and the applicable Roundtable Basin Implementation Plan and Education Action Plan. The Applicant is required to reference specific needs, goals, themes, or Identified Projects and Processes (IPPs), including citations (e.g. document, chapters, sections, or page numbers).

The proposed water project shall be evaluated based upon how well the proposal conforms to Colorado's Water Plan Framework for State of Colorado Support for a Water Project (CWP, Section 9.4, pp. 9-43 to 9-44;)

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This project supports the Colorado Water Plan and conforms to the CWP Framework as outlined in Section 9.4. Specifically, we are committed to collaborating, demonstrating sustainability, and establishing fiscal and technical feasibility of the project.

The proposed project meets the needs of core Water Values described in the Colorado Water Plan (Sec 1, Page 1-6): *"Efficient and effective water infrastructure promoting smart land use"* and *"A strong environment that includes healthy watersheds, rivers and streams, and wildlife"*. Specifically, the hydraulic improvements made to the site will support research and demonstration that leads to field-level adaption, improving water and energy efficiency through technology development, testing and demonstration. Conversion to more efficient sprinkler and drip irrigation will lead to reduced agricultural runoff at CSU-ARDEC. Multiple participants in on-site activities will include irrigators, water districts, irrigation consultants and technicians, students and the public.

Furthermore, the project addresses at least two CWP goals in the area of Water Conservation and Reuse, namely "Promote water efficiency ethic throughout Colorado," and "Seek creative options for improving agricultural irrigation conservation and efficiency." (Sec. 6.3, Page 6-59). The project helps achieve these goals by pursuing research and demonstration the area of Agricultural Conservation Efficiency, and Reuse (Sec. 6.3.4, Page 9-91) through the implementation of cutting-edge subsurface drip and a variable rate linear move irrigation sprinkler system. The nature of these technologies, and the expertise of CSU irrigation faculty working at the site, provides opportunity to investigate the water-energy nexus in an agricultural setting (Sec. 6.3.5, Page 6-109). The project will also advance knowledge among producers, technology providers, and researchers about profitable, productive water management using various tools and strategies to time irrigation and market crops as part of a new, CSU-Testing Ag Performance Solutions program that is being developed and launched with this funding support.

Considering Colorado's long-term goals for Municipal, Industrial, and Agricultural Infrastructure Projects and Methods (Sec 6.5, Page 6-127), this proposed project will work towards these goals, by installing irrigation infrastructure, including drip and sprinkler, and using the infrastructure for research in irrigation techniques and treatments for food safety and in water reuse research. The project will demonstrate to producers how to *"use water efficiently to reduce overall future water needs".* Automation and monitoring of surface irrigation flow will further allow for the quantification of improvements in farm water use efficiency.

CSU ARDEC lies within the South Platte River Basin. This project supports the South Platte/Metro Basin Roundtable's 2015 Basin Implementation Plan by meeting at least two of the Basin's goals (Page 1-25; https://www.colorado.gov/pacific/sites/default/files/SouthPlatteBasinImplementationPlan-04172015.pdf). First, in the area of Agriculture (Sec. 1.9.1), this project will "*Fully recognize the importance of agriculture to Colorado's future well-being, and support continued success and develop new voluntary measures to sustain irrigated agriculture"* by developing, testing, and promoting the most current technologies available for agricultural irrigation. Secondly, it will "*develop multipurpose storage, conveyance, system interconnections and other infrastructure projects to take advantage of limited remaining South Platte supplies and enhance water use efficiencies and supply reliability"* by increasing water application efficiency through the new drip and linear move, variable rate irrigation systems and thus alleviating the need for larger water diversions. Furthermore, the installation of automated head gate and canal flow controls will improve water diversion accuracy and allow for the

monitoring of conveyance efficiency in the North Poudre Irrigation Company's canal and diversion to the ARDEC ditch.

Improvements at CSU ARDEC are considered structural "Ditch and Diversion Improvements", as described in more detail in the statement of work section of this proposal. The greater purpose of the IIC and ARDEC, which under this proposal will gain improvements to its irrigation infrastructure, is to serve as the Colorado-based site for irrigation research. As described above and other sections of this proposal, the IIC applications research will support non-structural goals of SWSI, the CWP and BIPs through improved irrigation efficiency and water conservation; information and data requirements for ATMs, water rights and planning; improved energy use in irrigation water management; irrigation water quality monitoring and management; groundwater management and conjunctive use; outreach and education; and many other goals and objectives of the State of Colorado.

This proposed project strongly supports Colorado's aim for collaboration (Section 9.4, pp 9-43 to 9-44). The IIC is by definition a collaboration enterprise, a consortium, led by CSU, of five regional land-grant universities and other partners including industry, water districts, NGOs and others. The IIC housed within CSU's Soil and Crop Sciences Department and includes direct participation from other departments such as Civil Engineering, with engagement of the School of Business, Office of Sponsored Research, CSU Foundation, CSU Research Foundation, the Water Center, and others. Outside of CSU, the IIC has committed sponsorships from local, regional and national partners who have provided donations in the form of cash, services and equipment. For example, Northern Water is a founding member of the IIC, contributing cash and supporting an on-going, key research project evaluating 12 landscape irrigation controllers. Rubicon Water, based in Fort Collins, is supporting IIC with canal/ditch upgrades that will improve conveyance efficiency and control. Aqua Engineering, based in Fort Collins, is supporting the IIC with cash donations and with professional engineering designs for IIC irrigation infrastructure improvements.

The most immediate and direct impact of this project on CWP's goals will be by improving irrigation conservation and efficiency with industry-partnered applied research and adoption; for example, by extensive research on using remote sensing, soil moisture sensors, and other integrated technologies for reducing crop evapotranspiration and for improving efficiencies using the full range of irrigation technologies. Also, the IIC is implementing a broad outreach and education campaign that will ensure the water efficiency ethic is promoted throughout Colorado, and the U.S., with webinars, conferences, interviews with researchers and practitioners, educational materials and other communications.

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Related Studies

Please provide a list of any related studies, including if the water project is complementary to or assists in the implementation of other CWCB programs.

Gutierrez-Rodriguez, Eduardo, and Achyut Adhikari. "Preharvest farming practices impacting fresh produce safety." *Preharvest Food Safety* (2018): 19-46.

Gutiérrez-Rodríguez, E., et al. "Variable agronomic practices, cultivar, strain source and initial contamination dose differentially affect survival of Escherichia coli on spinach." *Journal of applied microbiology* 112.1 (2012): 109-118.

Burr, Charles, Daran R. Rudnick, and Matt Stockton. "UNL Testing Ag Performance Solutions (UNL-TAPS)." *ASA, CSSA, and CSA International Annual Meeting (2018)*. ASA-CSSA-SSSA, 2018.

Burr, Charles, et al. "UNL Testing Ag Performance Solutions (UNL-TAPS): Two Years of Engagement and Impact." *ASA, CSSA and SSSA International Annual Meetings (2019)*. ASA-CSSA-SSSA, 2019.

Lo, T.H., D.R. Rudnick, C.A. Burr, M.C. Stockton, and R. Werle (2019). Approaches to evaluating grower irrigation and fertilizer nitrogen amount and timing. Agricultural Water Management (213): 693-706. doi: 10.1016/j.agwat.2018.11.010

Stockton, Matt. "The Difference between Maximum Profit and Maximum Production." (2019). Cornhusker Economics, Sep 25, 2019. https://agecon.unl.edu/cornhusker-economics/2019/difference-between-max-profit-max-production

Previous CWCB Grants, Loans or Other Funding

List all previous or current CWCB grants (including WSRF) awarded to both the Applicant and Grantee. Include: 1) Applicant name; 2) Water activity name; 3) Approving RT(s); 4) CWCB board meeting date; 5) Contract number or purchase order; 6) Percentage of other CWCB funding for your overall project.

Allan A. Andales, “Improving irrigation efficiency through the development of the hydraulic infrastructure at Irrigation Innovation Consortium Headquarters” (revised title “Improving irrigation research capacity through development of hydraulic infrastructure at CSU-ARDEC”), in amount of $157,384 was approved by CWCB board on March 10, 2021. The project has been awarded but is yet to go under contract pending revisions as of this application date (7/1/21).

There is no other CWCB funding for our overall project.

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Taxpayer Bill of Rights
The Taxpayer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect your application.
None

Submittal Checklist	
X	I acknowledge the Grantee will be able to contract with CWCB using the Standard Contract.
Exhibit A	
X	Statement of Work(1)
X	Budget & Schedule(1)
X	Engineer's statement of probable cost (projects over $100,000) – See Exhibit C page 13
X	Letters of Matching and/or Pending 3rd Party Commitments(1)
Exhibit C	
X	Map (if applicable)(1)
	Photos/Drawings/Reports
X	Letters of Support (Optional)
	Certificate of Insurance (General, Auto, & Workers' Comp.) (2)
	Certificate of Good Standing with Colorado Secretary of State(2)
	W-9(2)
	Independent Contractor Form(2) (If applicant is individual, not company/organization)
Engagement & Innovation Grant Applicants ONLY	
	Engagement & Innovation Supplemental Application(1)

(1) Required with application.
(2) Required for contracting. While optional at the time of this application, submission can expedite contracting upon CWCB Board approval.

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Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Date:	July 1, 2021
Name of Grantee:	Colorado State University
Name of Water Project:	Developing irrigation infrastructure at CSU-ARDEC to support innovative research in irrigation efficiency, water use, and re-use
Funding Source:	CO Water Plan Grant and Colorado State University Funds

Water Project Overview:

The Irrigation Innovation Consortium (IIC) began in 2018 as a collaboration of five land grant universities, led by CSU, and has since added multiple industry partners as part of 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 self-sustaining 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. CWP Grant funding will support the improvement of irrigation research capacity at ARDEC.

The purpose of this grant application is to improve infrastructure and to establish the new research, training and outreach efforts of the IIC at CSU-ARDEC. 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 hands-on 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.

This project aims to: install new electrical, hydraulic, and network infrastructure at CSU-ARDEC to allow IIC to perform irrigation research, education, training, and outreach by having current irrigation technologies that support:

a. New research capacity in food-safety and water reuse to be conducted at ARDEC South on irrigated vegetable crops on furrow, sprinkler, and drip irrigation.
b. Develop and launch a CSU-Testing Ag Performance Solutions (TAPS) program.

Project Objectives:

1. Develop the hydraulic and electrical infrastructure for improved irrigation research at CSU-ARDEC for the new food safety/water reuse program
    a. Install a drip irrigation system for food safety and water reuse research
    b. Install necessary electrical, hydraulic, and networking infrastructure to operate proposed irrigation systems
    c. Install a side roll irrigation system for specialty crops research
2. Establish a Testing Ag Performance Solutions (TAPS) program led by IIC at CSU-ARDEC
3. Test the improved irrigation infrastructure and TAPS program for compliance with design specifications and prepare the systems for use in irrigation research, education, training, and outreach activities.

Tasks

Task 1 - Irrigation system for food safety research (Objective 1.a.)

Description of Task:

Install a drip irrigation system and filtration unit ($25,000) to facilitate research on irrigation water reuse and treatment to mitigate pathogen/contaminant contact with irrigated fresh produce.
Research will focus on the feasibility of water re-use, and the associated food-safety concerns resulting from using marginally clean waters in production of horticulture/produce crops. Current EPA approved sanitizers are only approved for treatment of irrigation systems, but not for treating irrigation water. This task will enable CSU to develop new and novel irrigation intervention treatments and strategies.

Method/Procedure:

CSU/IIC will hire an irrigation contractor to design and install the drip plot infrastructure and filtration in accordance with research plans from Dr. Eduardo Gutierrez-Rodriguez, Food Safety professor in the Department of Horticulture and Landscape Architecture at CSU. The installed drip plots will cover 1.53 acres of land.
Drip infrastructure donated to IIC by Jain USA will be used for this task (previously donated, i.e. will not be used as match for this grant; letter of commitment found in Exhibit C).

Deliverable:

- Irrigation system design
- Installation of drip irrigation and filtration systems

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Tasks
Task 2 – Electrical, pumps, ponds, IoT/Internet connectivity (Objective 1.b.)
Description of Task:
Update and expand irrigation pond and electrical infrastructure to accommodate new hydraulic improvements noted in other tasks.
Method/Procedure:
• Update the existing pond located at CSU-ARDEC South with a new pond liner, and install a new pump for water distribution • Form two, new 30'x30' ponds to match the existing pond with liner and suction pipe to pump station. • Install water line and valves to connect ponds to well and master water conveyance system over ARDEC South • Install two new pumps, concrete pads, for each new pond • Install electrical service with disconnects for the two new pumps CSU/IIC has already procured a cost estimate (Found in Exhibit C) from CSU Facilities to design, contract, and execute construction for this task. The program manager would ensure that CSU carries out these tasks in a timely manner in accordance with construction designs.
Deliverable:
• 1 renovated irrigation pond with new liner and pump • 2 new irrigation ponds, with liners, and pumps • Completed water conveyance pipeline • Completed electrical infrastructure to power two new pumps

Tasks
Task 3 – Irrigation system for specialty crops research (Objective 1.c.)
Description of Task:
Specialty crops require diverse irrigation systems to accommodate their early germination requirements, differentiating them from agronomic crops such as dent corn. It is common practice in commercial lettuce and carrot operations, for example, to direct seed and irrigate from above with a static or mobile sprinkler system to facilitate even wetting of the top 0.5" of soil to enable germination and emergence of the small seedlings. Once emerged, other irrigation systems such as drip irrigation are paired with the sprinkler to bring the crop to maturity. A mobile, side roll, sprinkler system will enable ARDEC researchers to replicate commercial grower practices for a wide array of projects including onion pathology work, produce safety projects, specialty crop block grant-funded projects, collaborative projects with private industry, etc.
Method/Procedure:
The program manager will coordinate with CSU Faculty, specifically, Troy Bauder, Karl Whitman, William Folsom, and Dr. Mark Uchanski to ensure a side roll system is sourced and installed over existing specialty crop research plots at CSU-ARDEC. A 312-footlong side roll was determined as an appropriate length to cover an existing 8.4-acre plot of land used for specialty crops research.
Deliverable:
• An installed, 312-footlong side roll irrigation system installed and tested at CSU-ARDEC to support the specialty crops research program

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Tasks
Task 4 –TAPS program development and Year 1 Competition (Objectives 2 & 3)
Description of Task:
Develop and launch a Testing Ag Performance Solutions (TAPS) program, initially established at University of Lincoln-Nebraska (UNL), and recently replicated at Oklahoma State University (OSU). CSU-TAPS will be an interactive, real-life farm management competition that helps producers, researchers, tech providers, and others identify how to boost agricultural profitability, and increase input use efficiency. The program gives producers and others a hands-on, no-risk, fun and competitive means to learn how to use various water management related technologies to effectively support in-season decisions. Participants also have an opportunity to refine their marketing strategies, compete for bragging rights, and get access to a large data set and an informed "community of practice" of their peers and others that advances agricultural water management factors critical for increasing adoption of tested tools and strategies that can help producers save water, energy, time, and money.
Method/Procedure:
a. Setting up the CSU-TAPS team and competition • Create CSU-TAPS work plan including detailed year-round schedule. • Review physical space layout, equipment, irrigation system upgrade to set scale of TAPS competition with initial # of teams to host in first year(s). Establish a statistically robust plot design for at least 6 teams to compete in the TAPS competition each year. • Purchase and install preliminary soil and crop monitoring equipment and do initial soil and water testing to offer baseline information and decision support to TAPS competitors. • Hire, train, and manage support staff activities (business development, communications, farm and student labor/interns. • Coordinate with UNL-TAPS and OSU-TAPS programs to set up CSU-TAPS team management protocols for scheduling irrigation and fertilization and managing data. **b. Establish and support CSU-TAPS community of practice** • Establish CSU-TAPS advisory board, including producers, water district leaders, CSU faculty/Extension, NRCS; Colorado Department of Agriculture (CDA), Division of Water Resources (DWR) to read them in on the program, and obtain their guidance to establish a 3-year vision and set CSU-TAPS program goals (e.g., increasing trust in using tech, featuring deficit irrigation protocols, managing salinity, tracking value of energy use and costs, irrigation scheduling, etc.), using the original programs in NE and OK as examples. • Identify people (can be board members or other) willing to serve throughout the season/program in different capacities, as participant role models, as marketing experts, etc. • Engage technology providers to identify who/which companies would be interested in instrumenting the program with their products, be featured, engage with producers during field days, and provide support during the season to helping foster trust re: data interpretation and data-supported decision making. • Explore/determine the unique aspects CSU can bring to this effort (for example, OK has cotton, UNL has added dryland wheat). Based on tech partners, CWCB interest in food systems, and our connections with Horticulture, explore the potential for a higher value vegetable crop production/input use efficient and marketing TAPS competition. **c. Communications** • Scope out what this CSU-based program needs to, develop (website, print, social media) outreach materials, and deliver effective science communications/practical output useful to collaborators and CO producers. Collaborate with UNL-TAPS and OSU-TAPS to fit the CSU piece for communications into broader TAPS/High Plains outreach effort. • Recruit competitors (as individuals and/or as teams) by reaching out to CO Master Irrigator graduates and others who have already participated in TAPS in other states, among others, and doing more public-facing outreach to recruit (using social media, website, press releases,

Tasks
presence at public-facing events, etc.) participants in the program, which will launch in the 2022 field season. • Coordinate and host launch event, banquet • Produce and post stories about the program throughout the year featuring participants, competitors, participants, tech providers, social/practical/technical insights, etc., as well as annual reports (internal-to-CSU and external facing) for each project year. **d. Business development** • Identify and engage program sponsors willing to donate equipment, sponsor field days (held at key points in the season- spring/fall) and/or banquet, cash prizes • Work to ensure longer term sustainability: (a) multistate program development to enable new beta-level ways for industry to engage in and use the TAPS competition and database to benefit their product development, evaluation, and testing. (b) Seek investment from donors including writing grants for state and federal opportunities to support the TAPS program concept and delivery, partly through grant applications, to support a 3-year+ vision. **e. Competition/participant management** • Work with the UNL-TAPS team to get CSU-TAPS branded into the competitors' online portal and test/ensure that front-end and back-end access is seamless. • Conduct surveys with competitors and technology providers, analyze and share data and insights with TAPS colleagues and supporting partners.
Deliverables:
a. Setting up the CSU-TAPS team and TAPS competition space • Detailed workplan and schedule • Established, instrumented, statistically robust field plot layout and clear field and data management protocols developed/implemented • Staff (five) engaged, hired and/or trained to support the project **b. Establish and support CSU-TAPS community of practice** • Board meeting minutes • Development of 3-year+ vision and goals and program operation manual describing CSU-TAPS program/competition in detail **c. Communications** • CSU-TAPS page on the IIC website; regular social media posts on Twitter, Facebook, Instagram, press releases, annual program report, in-season stories shared on digitally as well as in print for in-person events (like the banquet, at field days, shared with the CO Groundwater Commission, etc.) **d. Business development** • Annual business plan including report on donations, sponsorships, and other contributions/their value and goals/projections for future year • List of grant opportunities/descriptions used to secure additional program support • Annual description of multi-state TAPS partner activities and planning efforts **e. Competition/participant management** • Datasets related to input use and timing, survey data related to decision making in-season and post-season.

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Tasks
Task 5 - TAPS Year 2 Competition (Objectives 2&3)
Description of Task:
Continuation of the CSU-TAPS program, improving/refining the program as needed based on experience gained though setting up and running the program in its first year.
Method/Procedure:
Methods are largely the same as listed in Task 4, with limited time devoted to the physical space set-up and mission development and more time on revising and refining field protocols and implementation, effective communications among participants, sponsors, and other audiences. More emphasis will also be placed on communication of lessons learned as part of a network of TAPS-affiliated or connected researchers, producers, extension specialists, and others based in Colorado, Kansas, Nebraska, and Oklahoma.
Deliverables:
• Updated**,** detailed work plan and schedule for CSU-TAPS 2023 • CSU-TAPS Board meeting minutes • Updated program operation manual describing CSU-TAPS program/competition in detail • Regular updates of CSU-TAPS webpage on IIC's website; regular social media posts on Twitter, Facebook, Instagram, press releases, annual program report, in-season stories shared on digitally as well as in print for in-person events (like the banquet, at field days, shared with the CO Groundwater Commission, etc.) • Annual business plan including report on donations, sponsorships, and other contributions/their value and goals/projections for future year • List of grant opportunities/descriptions used to secure additional program support • Annual description of multi-state TAPS partner activities and planning efforts • Datasets and survey data generated from the program processed and their content made accessible to program managers, participants, colleagues, funders, and others.

Last Updated: June 2020

Tasks
Task 6 – Project Management
Description of Task:
To oversee and coordinate on-site construction, research program establishment, and selecting and hiring of employees to assist in overall project implementation.
Method/Procedure:
Project management will require 1 mo. per year for a project manager and 0.5 mo. per year for the PI. The project manager will ensure all aspects of the project are coordinated and managed as per budget and schedule requirements and testing of hydraulic infrastructure. The PI will oversee and assume overall responsibility for execution of project, ensure quality control and management, approve expenditures and compliance with contract requirements, prepare progress reports to CWCB, participate in TAPS events, and serve as CSU's point of contact for CWCB.
Deliverables:
• 1-2 student hourly employees selected and hired • Completed reports submitted to CWCB as per grant contract requirements (listed below)

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 as Exhibit B, found in the original submission folder.

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.

Last Updated: June 2020

Reporting Requirements

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
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Exhibit B
Budget and Schedule

Prepared Date: July 1, 2021

Name of Applicant: 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: 11/1/2021

Project End Date: 12/31/2023

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Irrigation system for food safety research	11/1/2021	10/31/2022	$25,000	$0	$25,000
2	Electrical, pumps, ponds, IoT/Internet connectivity	11/1/2021	10/31/2022	$60,000	$511,681	$571,681
3	Irrigation system for specialty crops research	11/1/2021	10/31/2022	$40,000	$0	$40,000
4	TAPS program development and Year 1 Competition	11/1/2021	10/31/2022	$221,579	$0	$221,579
5	TAPS Year 2 Competition	11/1/2022	10/31/2023	$136,616	$0	$136,616
6	Project management	11/1/2021	10/31/2023	$28,323	$0	$28,323
	Facilities and Administration	11/1/2021	10/31/2023	$76,728	$76,752	$153,480
			Total	$588,246	$588,433	$1,176,679

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Detailed Budget Estimate
Fair and Reasonable Estimate

Prepared Date: 06/23/2021
Name of Applicant: 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

Construction budget

	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds
Task 1 - Irrigation system for food safety res						
Drip irrigation system	each	1	$ 25,000	$ 25,000	$ 25,000	
Task 2 - Electrical, pumps, ponds, IoT/Internet connectivity						
Installation of electrical lines, pumps, ponds	each	1	$ 135,000	$ 135,000	$ 35,000	$ 100,000
IoT/Internet connectivity	each	1	$ 25,000	$ 25,000	$ 25,000	
Rehabilitation of groundwater wells	each	1	$ 411,681	$ 411,681	$ -	$ 411,681
Task 3 - Irrigation system for specialty crops						
Side roll sprinkler system	each	1	$ 40,000	$ 40,000	$ 40,000	
Task 4 - TAPS program development and Year 1 Competition						
TAPS plot instrumentation and testing - s	each	42	$ 881	$ 37,002	$ 37,002	
Set up, maintenance of instruments and s	month	1	$ 7,004	$ 7,004	$ 7,004	
Research facilities and equipment Use AF	season	1	$ 7,500	$ 7,500	$ 7,500	
Ag specialists (econ, irrig, extension, agro	month	4	$ 9,992	$ 39,968	$ 39,968	
Business development and industry enga	month	2	$ 10,594	$ 21,188	$ 21,188	
Project coordination and communication	month	9	$ 8,062	$ 72,558	$ 72,558	
Hourly worker - Student Hourly - (Fringe .	hour	958	$ 16	$ 15,359	$ 15,359	
Travel (mileage, lodging, per diem)	each	15	$ 600	$ 9,000	$ 9,000	
Events and outreach (Facilities,lunch/refr	each	3	$ 4,000	$ 12,000	$ 12,000	
Task 5 - TAPS Year 2 Competition						
TAPS plot instrumentation and testing	each	42	$ 36	$ 1,512	$ 1,512	
Set up, maintenance of instruments and s	each	1	$ 2,061	$ 2,061	$ 2,061	
Research facilities and equipment	season	1	$ 7,500	$ 7,500	$ 7,500	
Ag specialists (econ, irrig, extension, agro	month	2	$ 10,289	$ 20,578	$ 20,578	
Business development and industry enga	month	2	$ 10,912	$ 21,824	$ 21,824	
Project coordination and communication	month	6	$ 8,304	$ 49,823	$ 49,823	
Hourly worker - Student Hourly - (Fringe .	hour	958	$ 17	$ 16,319	$ 16,319	
Travel (mileage, lodging, per diem)	each	15	$ 600	$ 9,000	$ 9,000	
Events and outreach (Facilities,lunch/refr	each	2	$ 4,000	$ 8,000	$ 8,000	
Task 6 - Project management						
Project manager, with fringe TBN 2 (Fringe 2(	month	2	$ 7,109	$ 14,217	$ 14,217	
PI Salary, with fringe	month	0.96	$ 14,694	$ 14,106	$ 14,106	
Facilities and Administration						
IDC required by CSU, 15% of direct costs	each	1	0.150	$ 153,480	$ 76,728	$ 76,752
TOTAL				**$ 1,176,679**	**$ 588,246**	**$ 588,433**
Total direct costs				$ 1,023,199	$ 511,518	$ 511,681

CWCB Water Plan Grant

Name of Water Project: **Developing hydraulic infrastructure at CSU-ARDEC to support innovative research in irrigation efficiency, water use, and re-use**

Budget Justification:

A total of $588,246 is requested from the Colorado Water Conservation Board (CWCB) to develop existing hydraulic infrastructure at CSU's Agricultural Research, Development, and Education Center (ARDEC) in Fort Collins. The hydraulic infrastructure will support research and demonstration activities conducted by the Irrigation Innovation Consortium (IIC) and CSU faculty in efficient irrigation management, water treatment, and water reuse.

Task 1: Irrigation system for food safety research ($25,000)

Installation of a drip irrigation system along with a filtration unit ($25,000) will facilitate research on irrigation water treatment to mitigate pathogen/contaminant contact with irrigated fresh produce.

Task 2: Electrical, pumps, ponds, IoT/Internet connectivity ($60,000)

Electrical lines and two pumps will be installed ($35,000) in two new irrigation ponds that will supply water to the drip system (Task 1). Equipment for wireless Internet of Things (IoT) and Internet connectivity will be installed for telemetry of water and soil sensors ($25,000).

Task 3: Irrigation system for specialty crops research ($40,000)

A side roll sprinkler system for irrigation of approximately 8.4 acres of specialty crops will be installed ($40,000). The side roll system will include the sprinkler hardware and the pump.

Task 4: TAPS program development and Year 1 competition ($221,579)

Funds are requested to build capacity for a Testing Ag Performance Solutions (TAPS) program that will engage irrigated crop producers in team competitions that demonstrate efficient irrigation technologies and practices. Low cost IoT soil moisture sensors and loggers for 18 test plots (42 sensors total) will be assembled along with analysis, reporting and GIS software to manage spatial data along with soil and water sample analyses ($37,002). One month of a research associate's time (TBN 1, $7,004 salary and fringe* at 27.6%) is needed to setup the IoT sensors and software.

To implement the TAPS program, the ARDEC research facilities including farming costs are $7,500 for one year. Agricultural specialist costs are budgeted for 4 TBN specialists (TBN 6 – 9) at 1 person month each ($39,968 salary and fringe at 27.6%) and a business development and industry engagement specialist (TBN 4) for 2 months ($21,188 salary and fringe 27.6%). Project coordination and communication includes liaison with the UNL and other regional TAPS programs, setting up and managing events, engaging ag specialists, setting up the competitive teams and field management, and coordinating all aspects of the program. For this we are budgeting a Project coordination and communication specialist (TBN 5) for 9 person months

($72,558 salary and fringe at 27.6%) with support from TBN 4 to solicit support and funding from industry and an hourly worker at $15,359 (958 hours, $16/hour, fringe .02%). $9,000 for travel is required for TAPS development to meet with U. Nebraska colleagues for this assistance in setting up and implementing the program, to meeting with team members in Colorado and to assist team members with travel costs to events in Fort Collins and Denver. We are budgeting $600 per trip and 15 trips. Travel costs include mileage, per diem and lodging. We are planning 3 events, which are critical for the success of the program, that will involve team members (irrigators/producers from CO), CO TAPS Board members, staffs, CSU and IIC managers, and other stakeholder for events proposed to be held at ARDEC conference center. We are expecting 25 participants at each event and the budget includes facility costs ($1800/event), Lunch/refreshments ($1150/event), supplies ($200/event) and an award ($850/event).

Task 5: TAPS Year 2 competition ($136,616)

The second year of TAPS competition activities are similar to those detailed under Task 4 but will not require funds for program development. Year 2 will involve additional teams and more competition parameters. The instrumentation and testing will require only software updates and soil and water sample analyses.

GIS software updates are needed to manage spatial data along with soil and water sample analyses ($1,512). 0.29 of a month of a research associate's time (TBN 1, $2,061 salary and fringe at 27.6%) is needed to setup the software.

ARDEC research facilities including farming costs are $7,500 for year two. Agricultural specialist costs are budgeted for 4 TBN specialists (TBN 6 – 9) at 0.5 of a person month each ($20,578 salary and fringe at 27.6%) and a business development and industry engagement specialist (TBN 4) for 2 months ($21,824 salary and fringe 27.6%). A project coordination and communication specialist (TBN 5) is budgeted for 6 person months ($49,823 salary and fringe at 27.6%) and an hourly worker at $15,359 (958 hours, $16/hour, fringe .02%). $9,000 for travel is required for TAPS in year 2. We are budgeting $600 per trip and 15 trips. Travel costs include mileage, per diem and lodging. We are planning 2 competition events in year 2. We are expecting 25 participants at each event and the budget includes facility costs ($1800/event), Lunch/refreshments ($1150/event), supplies ($200/event) and an award ($850/event).

Task 6: Project management ($28,323)

To oversee and coordinate on-site construction, a project manager will spend 2 months of time, 1 month per project year, ($14,217 salary, fringe benefits at 26.7% and 3% inflation in year 2 included) for this project. Project manager 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 0.96 month of time, 0.48 of a month ($14,106 salary, fringe benefits at 26.7% and 3% inflation in year 2 included) to manage the grant funds, prepare progress reports to CWCB and participate in TAPS events.

Facilities and Administration ($76,728)

As per CWCB guidelines, 15% of the total direct costs was designated for facilities and administration (F&A) costs

*Fringe benefits are budgeted at CSU's FY22 approved fringe rates. Fringe will be charged at the rate in effect when salary is incurred.

Matching requirements

The project meets the matching requirements of CWCB. Per CWCB guidelines, 50% of the total project cost must be provided as match, with no more that 50% of the match in-kind. All matching funds for this project ($588,434) are cash to be spent by CSU on Task 2 (Electrical, pumps, ponds, IoT/Internet connectivity: $511,681) and on unrecovered F&A costs ($76,752). The matching funds come from the following sources.

Source	Amount	CSU Fund Manager
Faculty start up fund	$10,000	Dr. Eduardo Gutierrez-Rodriquez / Dr. Jessica Davis
CAS Dean's Office	$90,000	Dr. James Pritchett
ARDEC Wells Rehabilitation	$411,681	Facilities Management/CAS Dean's Office
Unrecovered F&A	$76,752	
Total:	$588,433	

$100,000 will be spent on reworking an existing pond and building two new irrigation ponds that will supply water for Task 1. In addition, CSU will spend $411,681 in rehabilitation of ARDEC wells that supply irrigation water to ARDEC ditches and ponds that serves multiple fields/systems that can be used by the IIC for irrigation research and the TAPS program. Well rehabilitation will replace the existing well casing and lining, pump, motor, electric feed, and electrical gear. The wells will be re-developed by fracturing the groundwater formation to improve water flow into the wells.


Red lines indicate the suggested path for the underground water lines that will bring water from the new well to different locations of the farm.
OP=old pond, P1: pond 1 for 2021 fiscal year and P2: pond 2 for fiscal year 2022
Pond circles are not drawn to scale
P1
P2
OP
NE Frontage Rd
E Co Rd 50
87
N
700 ft

FACILITIES MANAGEMENT
AT COLORADO STATE UNIVERSITY

REMODEL SERVICES
BUDGET OPINION

This Budget Opinion is for budgetary purposes only. Prices may change after design is complete

To: Eduaro Gutierrez-Rodriguez
Horticulture and Landscape Architecture, 1173
491-3192

Date: 03/31/21
Project #: 210331c
Customer ID# 1173
Expiration Date: 6/29/2021

P.M.	Phone #	Project title
Sam Wallner	567-1353	Hort Farm Irrigation Ponds and Pumps

Quantity	Labor/Material	Description	Unit Price	Less received	Line Total
		Existing Irrigation Pond			
1.00	Lab/Mat	Rework pond to replace liner.	$ 4,500.00		$ 4,500.00
1.00	Lab/Mat	Furnish and install new pump to replace the existing.	$ 6,467.20		$ 6,467.20
		Two New Irrigation Ponds			
1.00	Lab/Mat	Form two 30'x30' ponds to match the existing pond with liner and	$ 27,525.00		$ 27,525.00
		suction pipe to pump station. Install new pipe off north irrigation line			
	Lab/Mat	to two new ponds and install valves at tie in and at each pond.			
2.00	Lab/Mat	Furnish and install new pump to match the existing and place	$ 7,400.00		$ 14,800.00
		concrete pad to mount pump.			
1.00	Lab/Mat	Install electrical service with disconnects for the two new pumps.	$ 25,970.00		$ 25,970.00
				Construction Subtotal	$ 79,262.20
				Contingency	$ 7,926.22
				Design Fees	$ 6,340.98
				Third Party Code Review Fees	$ 908.00
				Project Management Fees	$ 7,926.22
				Advertisement Fees	
				Total	**$ 102,363.62**

This is a preliminary cost evaluation. Estimated pricing is based on currently available pricing information. It is possible that unknown conditions, a more detailed analysis, changes in scope and the bidding process could cause substantial changes in the estimate. Please do not send payment for construction based upon this amount.

Budget Opinion is for this project only and is subject to the conditions noted below:
1. Packing of book shelves or files prior to moving is not included.
2. Asbestos or Lead hazard assessment or abatement is not covered unless stated
3. This quote does not cover the activation of phone and data lines; customer will need to contact Telecom to activate lines

$ 11,212.09

To proceed please submit a Kuali Transfer of Funds document for the amount shown in red to the right, covering Design fees, Code Review fees, and 1/2 the PM fee. Our account is 7741480 OC 9904; your OC is 9905. For questions with this process, please call our Finance section at 970-566-1497. *For 53 funds please process a Kuali WOA.

Thank You For Your Business

Colorado State University

COLLEGE OF AGRICULTURAL SCIENCES
OFFICE OF THE DEAN

Colorado Water Conservation Board
1313 Sherman St.
Denver, CO 80203

June 30, 2021

To Whom It May Concern:

Developing irrigation infrastructure at CSU-ARDEC to support innovative research in irrigation efficiency, water use, and re-use

Colorado State University (CSU) is pleased to partner with the Colorado Water Conservation Board (CWCB) and the Irrigation Innovation Consortium (IIC) on the proposed project titled, "Developing irrigation infrastructure at CSU-ARDEC to support innovative research in irrigation efficiency, water use, and re-use" as part of CWCB's Water Plan Grants program. Dr. Allan A. Andales will be the Principal Investigator (PI) on the project.

To match CWCB funds, the College of Agricultural Sciences and Agriculture Experiment Station will contribute cash funds of $511,681 for improvement of the hydraulic infrastructure at CSU's Agricultural Research, Development, and Education Center (ARDEC). These contributions will come from a combination of CSU's ongoing ARDEC Wells Rehabilitation Project and funds for faculty research.

The College of Agricultural Sciences and the Agricultural Experiment Station is pleased to partner with the Colorado Water Conservation Board on this project. CSU is committed to the wise stewardship of natural resources, including water, for agricultural purposes in Colorado. Sustainable use of irrigation resources is an important component of this vision, and this project can improve CSU's capacity for research and demonstration in this area.

Sincerely,

Dr. James Pritchett
Dean, College of Agricultural Sciences
Director, Agricultural Experiment Station
Colorado State University

November 23, 2020

Dr. Allan Andales
Principal Investigator
Irrigation Innovation Consortium
1170 Campus Delivery
Colorado State University
Fort Collins, CO 80523-1170

Dear Dr. Andales:
On behalf of Jain Irrigation, Inc. (https://www.jainsusa.com/), I am writing in support of Colorado State University's (CSU) Water Plan Grant application titled "Improving irrigation efficiency through the development of the hydraulic infrastructure at Irrigation Innovation Consortium (IIC) Headquarters". Our Company is a founding partner in the CSU-led IIC and subscribes to its mission of accelerating the development and adoption of needed water and energy efficient irrigation technologies and practices through public-private partnerships in both the agriculture and landscape sectors. The development of the hydraulic infrastructure at the IIC Headquarters in Fort Collins, CO will enable the development, testing, and broad dissemination of cutting edge water efficient technologies and optimization strategies to enhance agricultural and landscape irrigation in Colorado and beyond.

In support of the development of IIC Headquarters, Jain Irrigation, Inc. commits to an in-kind donation of drip irrigation equipment (valued at up to $15,000) for up to 15 acres of agricultural fields. The donation will include Jain's revolutionary Turbo Tape® product that features built-in water filtration (through increased internal surface area) that could eliminate the need for dedicated filtration units in drip irrigation systems. We would be happy to provide planning and design advice for appropriate installation of the drip irrigation equipment.

I look forward to the development of the hydraulic infrastructure at IIC Headquarters and continued collaboration with CSU in developing and demonstrating water and energy efficient irrigation technologies that will benefit Colorado, the U.S., and the international irrigation industry.

Sincerely,

Aric Olson
President
Jain Irrigation, Inc.

2851 E. Florence Ave
Fresno, CA 93721
Ph: 800.695.7171
Fax: 888.434.3747

www.jainsusa.com

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