WaterSMART Grant

Water and Energy Efficiency Grant for Fiscal Year 2023

Funding Opportunity Announcement No. R23AS00008

PIDD Lateral D Modernization with Total Channel Control Implementation Project

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1.1 Executive Summary

This application is being submitted on 7/28/2022 for NOFO R23AS00008 by:
Paloma Irrigation and Drainage District (Category A Applicant)
Robert VanHofwegen, General Manager
Phone: (928) 683-2236 Email: robert.v@palomaid
38401 W. I-8 # 175 Gila Bend, AZ 85337, Maricopa County

The Paloma Irrigation and Drainage District (PIDD, District) canal system has operated for over 100 years using manual controls to deliver water to its users. This complicated system is inefficient and prone to mis-matched flows, spills, and overflows, requiring constant overwatch by maintenance and operations. PIDD relies on 84 wells (65%) as well as surface water from the Gila River (25%) that requires careful allocation and management to provide reliable flows/elevations as well as shutoff from miles away (challenged by PIDD 99-mile-long conveyance system).

Paloma Irrigation and Drainage District is continuing its goal of upgrading its water conveyance system to become the standard for Irrigation Districts in Arizona in water efficiency and energy management. The proposed project is **PIDD Lateral D Modernization with Total Channel Control Implementation Project.** PIDD is proposing to take a major system lateral and upgrade the lateral heading gate, in-line check structure gates, and turnout and terminal spill gates to Rubicon Supervisory Control and Data Acquisition (SCADA) controlled gates. In addition to modernizing the gates, PIDD plans to implement the latest technology in canal automation and operations by utilizing Total Channel Control (TCC), a volumetric flow accounting and management tool that results in zero spill operations when applied correctly. Synced with PIDD funded on-farm technologies including Rubicon Farm Connect and N-Drip, the TCC Canal System will provide the end users on demand irrigation water delivery for their on-farm irrigation practices helping to provide the highest irrigation efficiencies and least energy consumption. If implemented, the TCC Canal System will be the first in Arizona and can serve as a regional example.

PIDD proposes to replace 8 manually controlled Jack Lift gates at check structures and 23 manually controlled slide gates at turnouts that are inefficient, badly deteriorated, leaking, and poorly functioning, with new automated Rubicon SCADA controlled gates bringing PIDD into the 21st Century with state-of-the-art technology. One goal of the project is to increase agriculture within the District in a sustainable manner while also protecting and improving farming productivity. With continued drought in the Southwest, lands within the District have been fallowed due to insufficient water caused by upstream diversions or are being fallowed due to drought; these lands will suffer further degradation of the soil and reduced productivity. By automating the existing gates, the irrigation district and the growers can conserve water, thereby enhancing the limited supply. The objective would be to encourage growers to sustainably continue their agricultural operations in a manner that is supported by the PIDD Strategic Plan and infrastructure improvements. Another goal is to conserve available agricultural farmland productivity and water resources by efficiently and sustainably delivering surface and groundwater via an efficient irrigation system to agricultural lands within the District. With the continued drought and the high probability of a declaration of water shortage on the Colorado River from Tier 1 to Tier 2 in the foreseeable future, it is imperative that the PIDD protect its ability to deliver an adequate water supply to the District growers by automating the turnout and check gates with SCADA implementation in order to conserve available water resources. The objective would be to conserve the District's limited water supply through system automation and control, thereby conserving water resources. Another objective is to modernize the District's irrigation infrastructure with updated technologies to measure and deliver water as efficiently as possible and improve irrigation infrastructure to better support the District's end users and improve the local agricultural economy.

The District has been awarded:

- March 2020 Project 1 – Small-Scale Water Efficiency Projects (SWEP) ***to replace one 8-foot manually operative Jack Lift gate with a Rubicon gate (automated)*** that will serve as a model for future large-scale WEEG projects. (awarded)
- September 2020 Project 2 – Water and Energy Efficiency Grant (WEEG) ***to replace 10 out of 99 manually controlled jack lift gates that are inefficient, badly deteriorated, poorly functioning, with ten (10) new automated Rubicon Flume Gates*** to help bring us into the 21st century. (awarded)
- March 2021 – Project 3 – Small Scale Water Efficiency Projects (SWEP) *to* ***install 3 new automated Rubicon SlipMeter turnout gates*** for water delivery to producers off the 34-mile-long Gila Bend Main Canal. (awarded)
- October 2021 – Project 4 Water Conservation Field Services Program (WCFSP) for **Paloma Irrigation & Drainage District System Optimization Review** to study and optimize PIDD irrigation system. (awarded)
- April 2022 Project 5 – Small-Scale Water Efficiency Projects (SWEP) ***to install 3 new automated Rubicon SlipMeter turnout gates*** for water delivery to producers off the 34-mile-long Gila Bend Main Canal. (pending review)

This proposed project is PIDD's ***SIXTH*** WaterSMART Grant project and part of our overall plan to strategically modernize for water and energy conservation and upgrade our system with real-time technology, new automated gates, and associated components. PIDD will accomplish the goals established for the WaterSMART Program and the Biden Administration's priorities and executive orders (E.O. 14008 and 13985) by leveraging funding to address severe drought conditions, conserve and better manage our water resources, reduce energy consumption, and increase the efficiency of our system by slowly creating an integrated network of automated Rubicon gates that work in conjunction with our automated (18) and manual (84) well/pump systems. The District is fully supportive and wants to continue to build on our partnership with the United States Bureau of Reclamation (USBR, Reclamation) in funding and implementing these water conservation projects.

In May of 2018, PIDD selected Rubicon Systems to conduct a Scoping Study for our water delivery system to help us develop a plan to modernize our aging infrastructure with state-of-the-art technology with their "tried and tested" Rubicon Gates. A new study was completed recently (provided in Appendix). PIDD followed this up with a System Optimization Review (SOR) funded by Reclamation on technical elements and recommendations on a phased modernization conducted by George Cairo Engineering, Inc. (GCE), experts in water resources and district modernization. Because of the high cost to upgrade and network our entire system and the need to train our employees to successfully operate and maintain these systems, PIDD began by replacing individual gates and more recently multiple gates, leveraging grant funding and resources. If awarded, PIDD plans to complete this project within **2.5 years (July 2023 – December 2025, depending on the NTP date)**. Construction activities will not start prior to May 2023.

This project is not located on a Federal facility. The PIDD canal system was the largest privately funded irrigation project in Arizona history, built in 1919. This community has practiced self-reliance for many decades, but with high improvement costs, the drought, water shortfalls, impacts from climate change, and increased operating costs, labor shortages, and COVID 19 pandemic impacts, the District must seek ways to leverage funding from grants and develop strategies to continue to provide these critical services to produce food and fiber for the region. Implementation of the next phase of our modernization with the funding from this grant will allow us to work toward these goals and be good stewards of our water resources by saving large amounts of water.

1.2 Project Location

The Paloma Irrigation and Drainage District is located southwest of Central Phoenix, Arizona within the historical boundaries of Gila Bend and Buckeye, about 25 miles south of the confluence of the Gila River and Hassayampa River. It is downstream of the Aqua Fria River and the Salt River. Table 1 provides a description of each gate and its location.

A map of the entire Paloma Irrigation and Drainage District has been provided along with a project area map.

Table 1: Project Location Coordinates

No.	Gate ID	Existing Gate Type & Size	Latitude	Longitude
1	GD 0.1	Fabricated Slide Gate Turnout	32°55'46.29"N	112°52'22.41"W
2	GD2	Fabricated Slide Gate Turnout	32°55'36.71"N	112°52'30.78"W
3	GD3	Fabricated Slide Gate Turnout	32°55'25.69"N	112°52'40.63"W
4	GD4	Fabricated Slide Gate Turnout	32°55'25.61"N	112°52'40.70"W
5	**HGD2**	Jack Lift Check Structure	32°55'25.26"N	112°52'40.90"W
6	GD5	Canal Gate Turnout	32°54'56.47"N	112°53'24.56"W
7	GD6	Fabricated Slide Gate Turnout	32°54'45.82"N	112°53'38.37"W
8	GD7	Canal Gate Turnout	32°54'37.92"N	112°53'48.12"W
9	GD8	Fabricated Slide Gate Turnout	32°54'32.49"N	112°53'55.58"W
10	GD9	Fabricated Slide Gate Turnout	32°54'21.22"N	112°54'8.33"W
11	GD10	Fabricated Slide Gate Turnout	32°54'19.56"N	112°54'10.38"W
12	GD11	Fabricated Slide Gate Turnout	32°54'6.18"N	112°54'23.56"W
13	GD12	Fabricated Slide Gate Turnout	32°53'53.56"N	112°54'48.78"W
14	**HGD3**	Jack Lift Check Structure	32°53'53.22"N	112°54'48.95"W
15	GD13	Fabricated Slide Gate Turnout	32°53'39.93"N	112°55'0.97"W
16	GD14	Fabricated Slide Gate Turnout	32°53'26.48"N	112°55'28.40"W
17	GD15	Fabricated Slide Gate Turnout	32°53'13.23"N	112°55'53.37"W
18	**HGD4**	Jack Lift Check Structure	32°53'12.83"N	112°55'53.69"W
19	GD16	Fabricated Slide Gate Turnout	32°53'0.68"N	112°56'37.58"W
20	**HGD5**	Jack Lift Check Structure	32°53'0.85"N	112°56'38.01"W
21	GD17	Fabricated Slide Gate Turnout	32°53'13.20"N	112°56'42.61"W
22	GD18	Fabricated Slide Gate Turnout	32°53'26.04"N	112°56'46.79"W
23	**HGD6**	Jack Lift Check Structure	32°53'26.46"N	112°56'46.97"W
24	GD19	Fabricated Slide Gate Turnout	32°53'39.20"N	112°56'53.52"W
25	GD20	Fabricated Slide Gate Turnout	32°53'52.57"N	112°57'6.80"W
26	**HGD7**	Jack Lift Check Structure	32°53'52.77"N	112°57'7.17"W
27	GD21	Fabricated Slide Gate Turnout	32°54'5.22"N	112°57'22.60"W
28	**HGD8**	Jack Lift Check Structure	32°54'5.62"N	112°57'22.68"W
29	GD22	Fabricated Slide Gate Turnout	32°54'18.20"N	112°57'22.46"W
30	GD23	Fabricated Slide Gate Turnout	32°54'31.38"N	112°57'22.34"W
31	**HGD9**	Jack Lift Check Structure	32°54'31.74"N	112°57'22.43"W

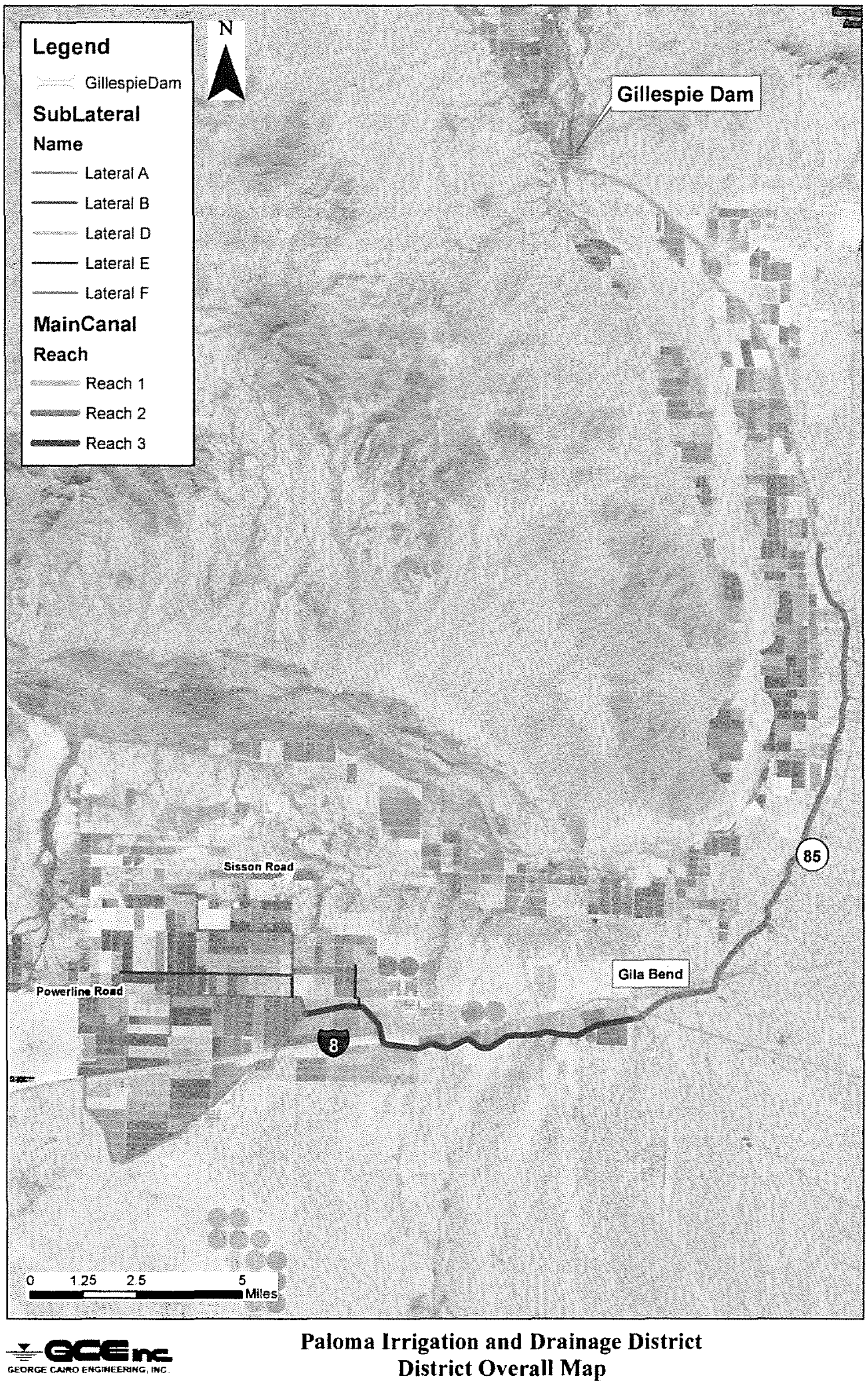

Figure 1: Paloma District Map

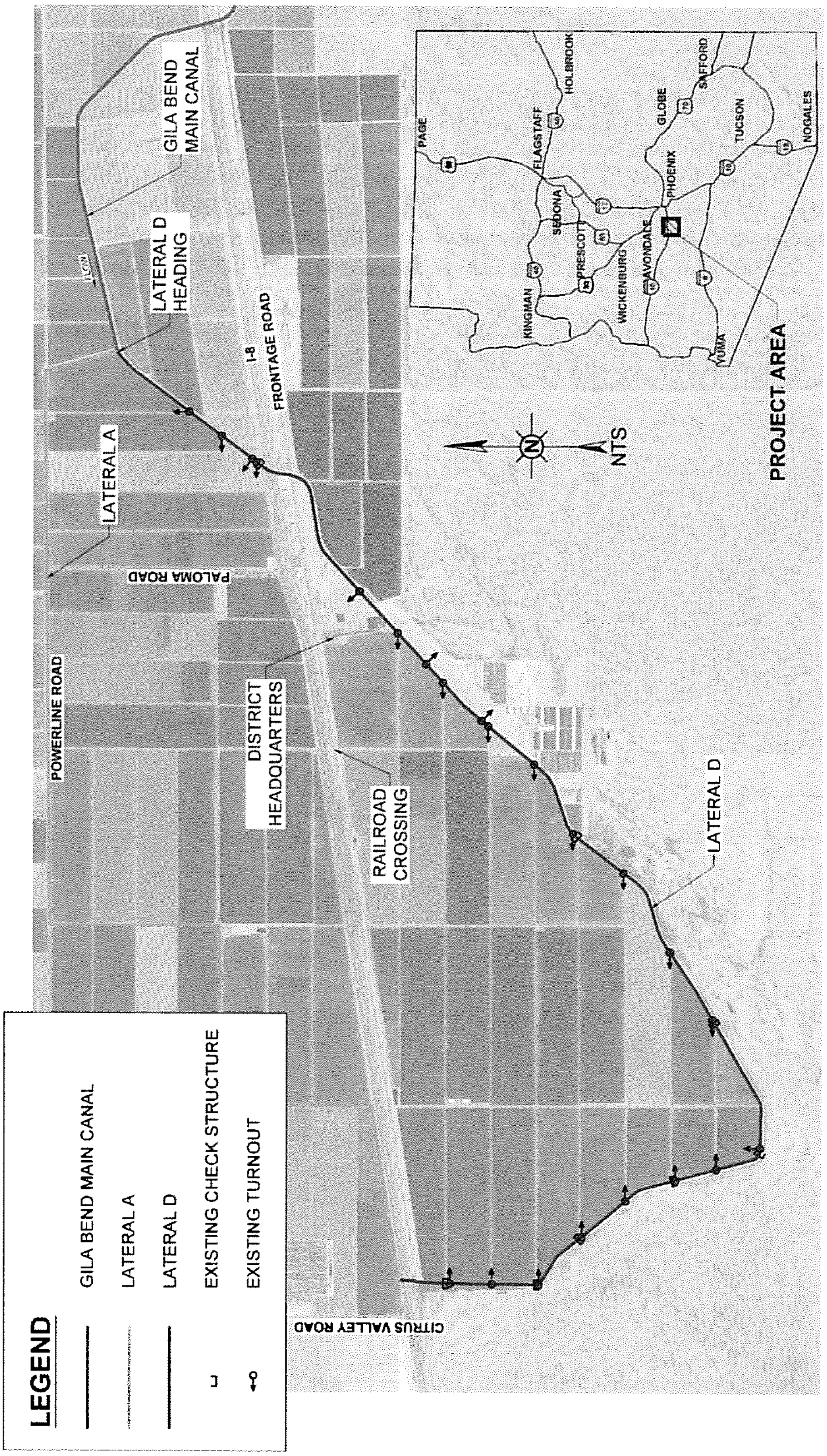

Figure 2: Project Location Map

1.3 Technical Project Description

Paloma Irrigation and Drainage District (PIDD, District) has operated for over 100 years using manually operated gates to deliver water to their water users. PIDD operates an open canal gravity supply network which diverts approximately 224,700 ac-ft per growing season to serve approximately 27,000 acres. The current system operation is completely manual except for a few Rubicon gates and is inefficient and prone to uncontrolled releases, spills, overflows and requires constant overwatch and maintenance. The District has water rights on the Gila River dating back to the late 1800s. The District's water source is approximately 35% surface water which is pumped out of the Gila River from its storage pool at Gillespie Dam, and 65% well water from wells located throughout the District. This project is located west of Gila Bend, Arizona at the end of the 34-mile-long Gila Bend Main Canal and delivers water to District farmland to grow crops such as alfalfa, cotton, and wheat.

The length of the irrigation season is generally 350 days a year and peak irrigation water demand occurs from May through September. The District's farmers order water and call for volumes at a desired time. The ability to provide the requested flow rate at the requested time is subject to capacity and system constraints. Requested deliveries are made through manual jack lift check gates and slide gates turnouts using orifice-based calculation for flow measurements. Antiquated controls result in canal water level fluctuations that occur during the day and evening which impact delivery flows. Further, the lack of flow measurement data exacerbates the volumetric measurement discrepancies resulting in delivery water losses. There is no existing radio system in the District, and telemetered devices are presently accessed using cell modems and an internet service provider.

It is PIDD's overall strategy and goal to update our operational strategy and gradually modernize aging canal infrastructure with Rubicon's total canal control with real-time technology using automated gates, SCADA implementation, flow measurement, and regulatory off-line and in-line storage facilities throughout the entire irrigation district. This **PIDD Lateral D Modernization with Total Channel Control Implementation Project** is an upgrade and modernization project for one of PIDD's primary service laterals, Lateral D. Precision measurement and automation of the canal operations provides a pathway to recover water loss, while providing an equitable high standard of service to all farmers in the network and also providing operational efficiencies, which in turn reduces the District's operating costs. The water loss can be recovered through a combination of improved canal operations to provide constant water levels for more consistent flows through turnouts and the adoption of improved high-accuracy delivery measurement devices. In implementing canal automation, the operational improvements available to PIDD on Lateral D as part of this project include:

1. Lateral D uses approximately 27,134 ac-ft annually. Annual average losses are 15-16% for Lateral D, approximately 5% due to evaporation and seepage and 11% due to manually operated gates causing spills. Water loss recovery for this project will be approximately 2,985 ac-ft annually. Over the life cycle (25 years) of the project, this equates to saving about 74,625 ac-ft.

2. More equitable and equal metering and billing arrangements for all irrigations delivered by the District.

3. Reduced water level fluctuations to facilitate more constant flows through the turnouts to result in less variance from the flow rate samples which are presently performed 6 times per irrigation event.

4. Provide constant supply levels to maintain more constant flow rates through turnouts to improve levels of service to irrigators and improve on-farm efficiencies.

5. Reduced manual operating costs resulting from telemetered provision of water levels and flow rates in the system and the ability to automatically regulate and control flows and water levels from the office.

6. Reduced operational spills at headgates and on the lateral tail end.

7. More flexible higher frequency operational adjustments providing an enhanced capability to provide on-demand water delivery to customers.

8. Reduced "Order On" Lead Times to allow irrigations to be more precisely timed to crop needs.

9. Reduced "Order Off" Lead Times to allow precise volumes to be applied on farm reducing tail water runoff or over applications.

10. Provision of irrigation decision support tools, such as online scheduling applications and monitoring of water usage for all irrigators in the District.

11. The opportunity for more flexible delivery arrangements on farm, with automation permitting the adoption of variable delivery times and flow rates to best match the farmers' on-farm irrigation requirements.

12. Opportunity to identify canal leaks and seepage and unauthorized usage by utilizing the flow rate measurement provided by the upgraded flow control and turnout gates.

13. Operational improvements provided by full integration between the flow regulating gate structures and groundwater pumps.

14. Provides improved delivery service allowing for upgraded and modernized on-farm irrigation systems that qualify for Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP) funding.

Work to be Accomplished and Approach

PIDD's concrete lined Lateral D serves approximately 3,900 acres of farmland with 23 turnouts and 8 in-line check structures. The majority of the existing turnouts are fabricated steel slide gates mounted to concrete structures with 30-inch diameter pipes to deliver water to the farm adjacent farm head ditches. All gates are fabricated in house by district labor forces and are replaced every five years due to high corrosion from the water. The existing check structures primarily consist of three four-foot-wide bays with three fabricated slide gates. The district operators measure to estimate water levels and use the orifice equation to determine the flow rate and set the deliveries at the check structures and turnouts. While this is a reliable method of flow measurement, it requires constant monitoring and adjustment if the upstream and downstream water levels change leaving room for error.

It is proposed to replace the manual turnout gates with Rubicon SlipMeter Gates or Rubicon Pikometer Gates and to replace the manual slide gates on the check structures with Rubicon Flumegates. These Rubicon gates are solar powered and automated gates with flow measurement built in, as a result, the district operators will be able to monitor and control flows for deliveries to reduce significant spills and improve on farm efficiency. The Lateral D also has some inflows along the canal from tailwater sump pumps, wells, and drainage which adds to the complexity of flow control in the lateral. The Rubicon Flumegates in the lateral will be able to automatically adjust to changes in flow rate to hold a constant water level and pass excess flows to sump ponds or alert the upstream gates at the heading of Lateral D to throttle down to account for the extra inflows.

In addition, some of the farmers in the district are working to implement Rubicon's Farm Connect hardware through support from the Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP) to improve their on-farm efficiency by using this system which monitors advance and recession of irrigation sets and controls the headgate delivery for optimum shut off and reduced spills or over application. Once a Rubicon SlipMeter gate is installed at the turnout, the Rubicon Farm Connect will automatically monitor inflows and close the gate when needed reducing spills that would be caused by travel time and operator coordination with a manual turnout gate.

All the turnout structures will need to have concrete repair work done or be completely replaced with new precast or cast on site structures to accommodate new Rubicon gates. Most of the existing turnout structures are weathered and damaged near the top; at these locations they will be sawcut to solid concrete and repaired. The SlipMeter gates will be side mounted in the existing or new turnout structures with new additional bulkhead slots installed behind for future gate maintenance. Dirt plugs will be used to address any nuisance water in the canal.

On existing check structures some of the wingwalls are in good condition and can remain in place; the center walls will be sawcut and removed, and two precast U-channels be placed in between the existing wingwalls for the new Rubicon Flumegates to mount. The rest of the check structures that are badly spalled and falling apart will be removed and replaced with two new U-channels to form the bays of the check structure. Concrete lining transitions will be installed to tie back to the existing lining upstream and downstream.

The Rubicon Total Channel Control (TCC) network solution provides automated regulator gates, a data-radio network, canal network control software and a remote monitoring and management platform to assist irrigation district managers to achieve new levels of customer service and distribution system efficiencies by using volumetric unsteady-state hydraulics. Once these gates are installed and operational, they will save water by reducing spills and inefficiencies, providing more water to the other laterals, and reducing pumping costs in the Gila Bend Main canal which are used to lift the water from the Gillespie Dam.

Rubicon's Total Channel Control (TCC) solution brings together FlumeGates, a radio network to enable gate-to-gate communication, a remote management and telemetry system called SCADAConnect and channel network control software called NeuroFlo. These components operate together, passing level and flow information along the length of the D Lateral canal ensuring a coordinated response right up to the lateral heading and eventually the dam and pumping stations. Any increase in water extraction anywhere in the system (including leaks and evaporation) can be supplied by all the in-channel FlumeGates opening the right amount. Any reduction in extraction (including local rainfall and irrigation rejection shut offs) results in FlumeGates closing along the channel, effectively storing the water in the canal pools for later use. This is all feasible because of the Rubicon Flumegates precise flow measurement and control that regulates the flow through each check structure while maintaining canal pool elevations. Rubicon's flow control products will be installed at regulating structures in series along the channel. Accurate flow measurement and precision motor control precisely regulates the flow through each regulating structure.

Radio communications via Rubicon's integrated telemetry enables each site management device to share information with upstream and downstream gate-controlled sites, providing redundant distributed control capability for safe autonomous operations. NeuroFlo™ is the digital software that optimizes water control. When a FlumeGate receives flow and level information from an upstream or downstream check structure or from a turnout, the NeuroFlo software determines the response. NeuroFlo determines by how much the FlumeGate should open or close, by how much it should increase or decrease flow to supply water flowing out and to keep water levels at the desired level.

SCADAConnect™ & Network Visualization with the SCADAConnect software constantly monitors canal pool operations to alert District operators to any potential abnormal behavior. Detailed visualization, navigation and dynamic analysis of channel flows and levels in real time and intuitive configurable alarms ensure that District operators have all the information they need to manage the system and prevent system losses due to mismatched flows eliminating spills.

Table 2: Rubicon Gates and Automation/Measurement Controls to be Installed

No.	Gate ID	Existing Gate Type & Size	New Gate Type & Size
1	GD 0.1	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
2	GD2	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
3	GD3	Fabricated Slide Gate Turnout 31.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
4	GD4	Fabricated Slide Gate Turnout 31.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
5	**HGD2**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587
6	GD5	Canal Gate Turnout 24" Diameter	Rubicon 18" Pikometer Model PM-450-1400
7	GD6	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
8	GD7	Canal Gate Turnout 24" Diameter	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
9	GD8	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
10	GD9	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
11	GD10	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
12	GD11	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
13	GD12	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
14	**HGD3**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587
15	GD13	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
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20	**HGD5**	Jack Lift Check Structure 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587
21	GD17	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
22	GD18	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
23	**HGD6**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587
24	GD19	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
25	GD20	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
26	**HGD7**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587
27	GD21	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
28	**HGD8**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587
29	GD22	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
30	GD23	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C
31	**HGD9**	Jack Lift Check Structure 2 Bays 42" Width Opening	Rubicon 38.5" Fume Gate 2x Model FGB-0626-1077

If awarded, PIDD plans to complete this project within **2.5 years (July 2023 – December 2025, depending on the NTP date)**. Construction activities will not start prior to May 2023. 20% of the Lateral D project will be constructed in October – December 2023, 40% will be constructed in October – December 2024, and 40% will be constructed in October – December 2025.

Engineering/Design Work Required for Project *Allows for time for review*
This technical support will be performed by George Cairo Engineering, Inc. (GCE, Cairo) and Rubicon Systems Australia Pty Ltd (Rubicon) – both have provided professional services for installation of multiple projects for PIDD that included automated Rubicon gates.

- Planning of System Improvements - GCE
- Design and Fabrication of Rubicon Gate, Controls and Framework - Rubicon
- Preliminary and Final Design of Concrete Structures and Concrete Structures Modifications and Appurtenances - GCE
- Order Gates – PIDD (Long Lead Item, may need 16 weeks lead time for fabrication)

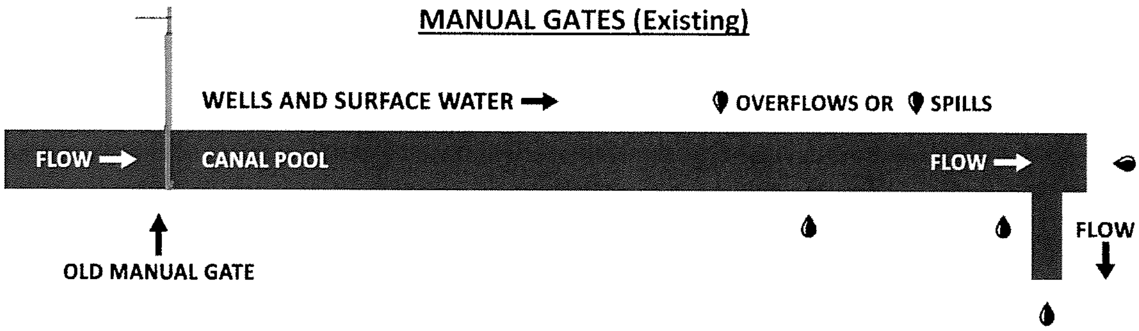
Pre-Construction/Site Preparation for Project *One or more sites, may be done concurrently, grouped by operational phasing and proximity/same canal system.*
Time is of the essence for water outage work, try to complete all activities to reduce Dry-Up time.

- On-site support/final planning and safety/COVID 19 meetings – GCE, Rubicon and PIDD, concrete and civil works contractor.
- Begin Safe Dry-down to prevent canal liner damage, include notification to producers/growers – PIDD
- Mobilization of PIDD Employees and Equipment
- Begin pre-casting or ready to cast in place concrete structures (Sidewalls, Aprons, Sills, miscellaneous metals, and Appurtenances) – Concrete and Civil Works Contractor
- Order Additional Concrete

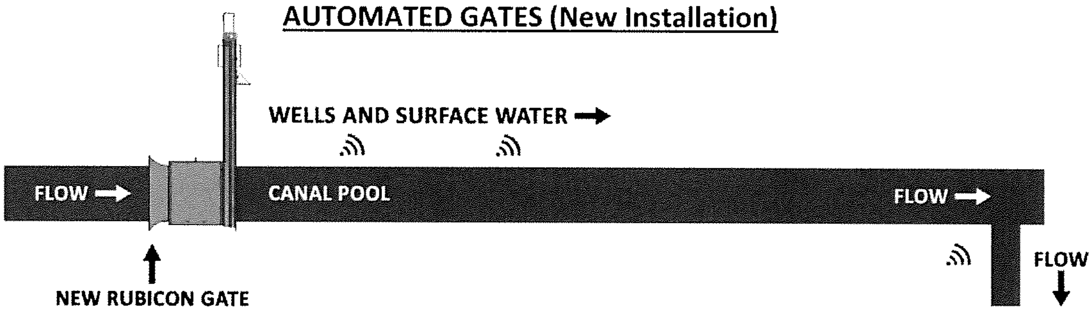
Construction and Installation *One site or more, may be done concurrently, grouped by operational phasing and proximity/same canal.*

- Implementation of all safety measures and COVID 19 requirements
- Install nuisance water dirt plugs and small temporary pumps
- Removal of Manual Gate and Demolition/Removal of any required structure elements – PIDD and Contractor
- Continue to Coordinate/schedule with affected water user(s) – PIDD
- Final Site Preparation - PIDD Equipment Operator and Contractor
- Concrete Foundation (Sidewalls and aprons) – PIDD and Contractor, and GCE (Oversee)
- Gate Installation (Attach to concrete structures). Upgrade of inline check structures with water-tight precision flow control gates. – PIDD, Contractor, and Rubicon, and GCE (Oversee)
- Integration of a radio telemetry network and SCADA software to allow the remote operation and control of these gates and the control and measurement of ground water wells – PIDD and Rubicon, GCE (Oversee)
- Tune controllers to allow these gates to cooperate to match supplied flow to downstream demand through the system – PIDD and Rubicon, GCE (Oversee)
- Automation of lateral offtakes to improve operations on the laterals – PIDD and Rubicon, GCE (Oversee)
- Measurement (and control) of flows through farm turnouts – PIDD and Rubicon, GCE (Oversee)

A schematic of a Rubicon gate with automated controls has been provided below.



- Gate adjustment, ditch rider on-site full-time
- Try to maintain constant flow/elevation – fluctuation +/- 2FT, yields variable, inefficient deliveries
- Must anticipate when to stop pumps and adjust gates to match flows and provide water needed
- Close to soon → inadequate delivery
- Close too late → excess flows carry downstream can cause overflow/flooding or loss (downstream gates open to prevent flooding and system overflow)



- Adjusts automatically, ditch rider uses integrated network controls
- Maintains canal pool constant flow/elevation
- Gate adjusts precisely when needed
- Yields steady deliveries

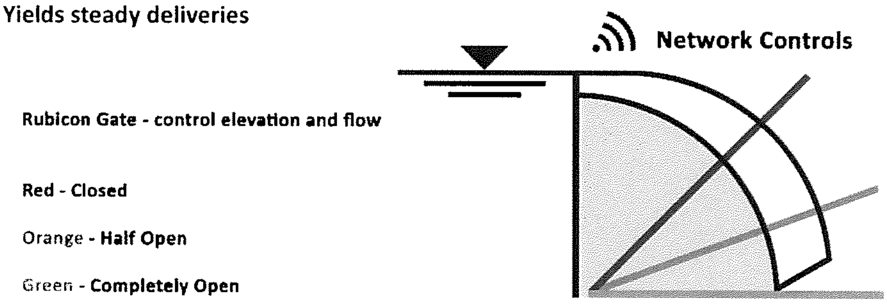


Figure 3 Schematic Design of Automated System Before and After New Installation

Post-Construction
Installation/testing of automation systems/controls
Commission gates and certify accurate measurement and operation
Lessons learned sessions after project construction

Closeout/Reports
As required (Progress Reports - Semi-Annual).
As-build final installation
Final report with documentation

1.4 Evaluation Criteria

A. Quantifiable Water Savings

Paloma Irrigation and Drainage District manually operates an open canal gravity supply network which based on the average for the last 10 years of record diverts approximately 224,700 ac-ft per growing season to serve 27,000 acres. The system delivers 188,000 ac-ft to farms, and there is presently about an 18,000 ac-ft gap in water supply losses, which are not recorded and billed as deliveries. Every time water is delivered to a farm, the inadequacy of this manually controlled system is demonstrated by requiring an on-site person to constantly adjust flow rates to prevent flooding/overflows/erosion/water loss upstream. In addition to water impacts the labor cost to PIDD is substantial. The proposed project will further modernize the PIDD and save resources while being better stewards of the available natural resources.

This proposed water and energy efficiency modernization project will have a positive impact to our entire irrigation system by reducing a significant portion of the annual water loss of 18,000 acre-ft/year in the D Lateral with the new Automated Measurement Device and Rubicon gate control system (Based on type of crop and growth cycle, irrigation distribution method, and frequency and length of water delivery). This project will ensure better water use efficiency, integrated control, reliable/constant flow, less water level fluctuations, quick detection/ prevention of leaks or spillage, less time required for delivery (from initial request) moving towards on-demand irrigation delivery, improved coordination/collaboration with water users, improved response time for Orders (On and Off), and less pump use, all contributing to a more responsible use of water resources, less water loss and decreased operating costs.

Improving water conservation by delivering water in the amounts needed and when it is needed, at an increased efficiency, will also improve on-farm water use efficiencies. Water savings will also reduce ground water pumping, contribute to the overall health of the groundwater basin, and the surrounding fragile desert ecosystem. Protection of the local groundwater resource is vital to the long-term economic viability of PIDD and the local region. In addition, higher yields of crops using the available water supplies in the District can help meet crop demands and reduce crop water use in other areas of the state resulting in less water use from the Colorado River helping drought management in the Basin.

1) Describe the amount of estimated water savings. For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project.
Please include a specific quantifiable water savings estimate; do not include a range of potential water savings.
Paloma Irrigation and Drainage District manually operates an open canal gravity supply network. Flow rates are measured at the head gate to the lateral which serves the customer. Run times, start, and stop times are on the ditch rider's inspection record. Volumes are computed and transferred to a water card by the ditch rider which based on the average for the last 10 years of record diverts approximately 224,700 ac-ft per growing season to serve 27,000 acres. The system delivers 188,000 ac-ft to farms, and there is presently about an 18,000 ac-ft gap in water supply losses, which are not recorded and billed as deliveries.

Included in overall system losses are the system structural deficits that include evaporation losses and seepage losses. Based on the overall system, water losses are approximately 15-16% for Lateral D: approximately 2% losses for evaporation, 3% losses for seepage, and 11% losses to manually operated gates causing spills. This project will recover approximately 11% losses, which equates to approximately 2,985 acres annually. Over the life cycle (25 years) of the project, this equates to saving about 74,625 ac-ft.

This proposed water and energy efficiency modernization project will have a positive impact to our entire irrigation system by reducing an estimated significant water loss of 18,000 acre-ft/year with the new Automated Measurement Device and Rubicon gate control system (Based on type of crop and growth cycle, irrigation distribution method, and frequency and length of water delivery). Improving water conservation by delivering water in the amounts needed and when it is needed, at an increased efficiency, will also improve on-farm water use efficiencies. Water savings will also reduce ground water pumping, contributes to the overall health of the groundwater basin, and the surrounding fragile desert ecosystem.

2) Describe current losses: Please explain where the water that will be conserved is currently going and how it is being used. Consider the following:
The following are typical losses in PIDD's canal distribution network:

Operational (Greatest Factor): Operational spill/Over delivery is a common loss component for irrigation districts who supply water in an on-demand fashion which enables farmers to request specific flow rates, start times and irrigation durations. PIDD provides an order-based delivery service to its farmers, and so operational spills will be a component of system losses. It is understood that when the sum of demand exceeds the supply capacity of the canal network, orders are scheduled in a quasi-rotation basis which means that the delivery characteristics of the canal are typically like those of a rotation-based district in which the canals are run at maximum flow capacity and deliveries are multiplexed between farms based on a 24-hour delivery window.

- Complexity of system (water sources – groundwater wells and river water, great distance from sources and logistics, flow measurement, pump lift stations, no regulatory storage – person-required on site to manually control gates, crop production impacts)
- Increases risk for human error, miscalculation (Longer run-times, mismatched flows, spills, inadequate water level/elevation, stop and re-starts)
- Poorly Functioning Gates (Leakage)
- Operational mismatches are carried to the tail end of the system laterals and Main Canal where they are spilled
- Length of Conveyance/Time with majority of demands at lower end requires balancing of pools manually
- Typical canal levels at PIDD can vary from ½ to almost 2 feet, thereby having a significant change in the actual flow (and therefore volume) delivered

Measurement and Delivery: Inaccurate delivery measurement – the district supplies water to farms through undershot turnout gates and uses a submerged orifice equation with an assumed 5% accuracy (as determined by the PIDD). District employees measure the upstream and downstream heads across the orifice generally 6 times per 24-hour irrigation block. If the sampling of these head conditions is coupled with gate adjustments, then volumes delivered has a degree of uncertainty based on the operator's skill at measuring and making gate adjustments. Intermediary canal fluctuations between gate readings and adjustments results in unsteady deliveries and inefficiencies in deliveries.

Conveyance Losses (Seepage and Evaporation): PIDD's canals are concrete lined in average to poor condition therefore seepage occurs through concrete cracks in the canal liner or deteriorated joints. A high rate of evaporation from the exposed water surface occurs due to desert high temperatures, conveyance travel time, exposed surface area, and effects of hot winds. The evaporation and seepage losses in the District are categorized and combined as the system structural deficit that includes all these losses. The losses are estimated to be about 5% based on historical pond tests.

Based on the overall system, water losses are approximately 15-16% for Lateral D: approximately 2% losses for evaporation, 3% losses for seepage, and 11% losses to manually operated gates causing spills. This project will recover approximately 11% losses, which equates to approximately 2,985 acres annually.

- **Explain where current losses are going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground)?**

The system losses include evaporative losses to the atmosphere, and seepage losses into the ground beneath the conveyance channels due to the concrete lining condition. Operational spills outfall to local ephemeral wash areas, and open desert areas. A minor portion of the water loss is collected at a small tailwater collection sump. Losses out of tail end of D lateral spill into Sump/Lift 4. This sump has a limited ability to put "spilled" water to beneficial use. Most is spilled to the wash.

- **If known, please explain how current losses are being used. For example, are current losses returning to the system for use by others? Are current losses entering an impaired groundwater table becoming unsuitable for future use?**

Currently, losses outfall to local ephemeral wash areas, and open desert areas typically lost to evaporation or evapotranspiration from weeds or other vegetation. During major outfalls or ones that coincide with weather events there may be enough flow that it ultimately drains to the Gila River alluvial fan areas or the channel. The seepage losses are entering an impaired shallow portion of the groundwater table becoming unsuitable for future use and not used directly. Due to their unpredictable nature, almost all of these losses are spilled despite running through Sump/Lift 4. Their unpredictability means the ditch riders do not count this water when calculating how much to send to the sump for delivery to growers.

- **Are there any known benefits associated with where the current losses are going? For example, is seepage water providing additional habitat for fish or animal species?**

The water lost through terminal spills may eventually make it to the river helping the river arid environment, but most of the time, spilled water is lost to seepage and unsuitable for future use before it gets to the river or is being used directly by weeds and other native vegetation. The water has some environmental benefits in that while it is actively spilling it can be used by local wildlife and plant growth of large plants like native trees that sequester carbon and provide habitat for native species.

3) Describe the support/documentation of estimated water savings: Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Note: projects that do not provide sufficient supporting detail/calculations may not receive credit under this section. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal.

In addition, please note that the use of visual observations alone to calculate water savings, without additional documentation/data, are not sufficient to receive credit under this section. Further, the water savings must be the result of reducing or eliminating a current, ongoing loss, not the result of an expected future loss.

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The following table is a summary of the recent years average data.

Table 3: Water Savings

Lateral	Total Volume (AC-FT/YR)	Operational (AC-FT/YR) 11% of Total Volume	Evapotranspiration (AC-FT/YR) 2% of Total Volume	Seepage (AC-FT/YR) 3% of Total Volume	Total Savings (AC-FT/YR)
Lateral D	27,134	2,985	543	814	2,985

4) Please address the following questions according to the type of infrastructure improvement you are proposing for funding.
(1) Irrigation Flow Measurement: Irrigation flow measurement improvements can provide water savings when improved measurement accuracy results in reduced spills and over-deliveries to irrigators.

- **How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.**

The annual water savings values estimated were calculated using our data collected by our ditch-riders (unless otherwise noted). Calculations (Seepage and Evapotranspiration) as well as actual real-time measurements (Volume change over time for section of canal blocked). Volume (Original Water Depth) – Volume (End Water Depth after 24 hours). Volumes (Actual amount of water released).

- **Have current operational losses been determined? If water savings are based on a reduction of spills, please provide support for the amount of water currently being lost to spills.**

The current operational losses values estimated were calculated using our data collected by our ditch-riders (unless otherwise noted). Calculations (Seepage and Evapotranspiration) as well as actual real-time measurements (Volume change over time for section of canal blocked). Volume (Original Water Depth) – Volume (End Water Depth after 24 hours). Volumes (Actual amount of water released).

- **Are flows currently measured at proposed sites and if so, what is the accuracy of existing devices? How has the existing measurement accuracy been established?**

Flow measurements of turnout gates and canal in-line check structures are currently calculated at the proposed improvement sites using field methods based on the application of the orifice equation at the structure and gate installation with a manual field measured gate opening position, and field measured or estimated water depths. Field values are then used against rating tables and flows determined. Accuracy of the measurements varies due to varying water levels in the canal, human error in determining gate position or water levels, and partially or fully submerged gate conditions may not be corrected in the flow calculations all leading to a degree in error in the current measurement approaches.

Flow accuracies vary from plus or minus 5 percent to 20 percent depending on local conditions and field error as previously described which was determined by on-site observations and back checking by George Cairo Engineering professional staff certified in flow measurement.

- **Provide detailed descriptions of all proposed flow measurement devices, including accuracy and the basis for the accuracy.**

Proposed devices are modern Rubicon gates to be used to control water levels or flows and also simultaneously measure flows at all structure locations. The Rubicon Flumegate use overshot leaf gates with integrated flow calculation and control software, ultrasonic water level sensors, robust gate position cables, approach velocity adjustments in the calculations and the appropriate weir equation and coefficient based on the position of the gate and hydraulics. Measurements are also corrected for hydraulic partially and fully drowned conditions. In proper installations these gates have been lab tested and certified to measure within plus or minus 2.5 percent accuracy or 97.5 percent flow accuracy.

The Rubicon SlipMeter is a flow meter with an integrated control gate designed to automate farm supply points, in-channel regulators and at turnouts. The SlipMeter uses Rubicon's unique ultrasonic array flow measurement technology to accurately measure flows even in turbulent conditions. Instantaneous flow rate and total volume passed are recorded, providing a precise account of water usage. It features a local LCD display which provides irrigators with the ability to control the supply point and view instantaneous flow rate, volume of current delivery, and total flow volume for the season. The SlipMeter can be managed and monitored on-site or operated remotely when connected to a SCADA network. In proper installations these gates have been lab tested and certified to measure within plus or minus 2.5 percent accuracy or 97.5 percent flow accuracy.

- **Will annual farm delivery volumes be reduced by more efficient and timely deliveries? If so, how has this reduction been estimated?**

YES, currently farm turnout gates are open by District zanjeros for desired delivery flow rates and typically not adjusted during a delivery set; therefore, fluctuating water levels in the D Lateral will vary delivery rates to farm head ditches. Varying delivery rates to farms can result in application efficiencies. More efficient and timely steady water deliveries will yield higher on farm delivery efficiencies with less on-farm spills improving on-farm water usage efficiencies.

Estimates of water savings is based upon our current losses from spills, stops and restarts, overflows, and increased delivery durations due to less than optimum water levels/elevations and multiple users. In addition, NRCS has conducted farmer irrigation evaluations to determine application efficiencies of individual irrigation sets and irrigation seasons for local farms.

- **How will actual water savings be verified upon completion of the project?**

PIDD will put a data collection and management program in place and use the data collected with the new gates to compare annual water delivery volumes over the previous 10-year period with post-project water delivery volumes. Also, this information will be used with NRCS conducted farmer irrigation evaluations to determine application efficiencies of individual irrigation sets and irrigation seasons for local farms post improvements.

B. Renewable Energy

The District plans to implement future Canal Energy System (CES) installations for renewable energy generation via micro-hydro and canal spanning solar projects including on the Lateral D. With the assistance of George Cairo Engineering, we are completing our System Optimization Review and will use the results to prioritize those projects to offset pumping costs and help support the issues with Federal Hydro Generation and drought impacts.

On this proposed project the gate replacements and automation of the PIDD Lateral D does not result in the direct creation of a renewable energy source. However, the automation of the lateral does support renewable energy use and traditional energy reduction in a significant fashion. These include:

- The use of solar energy for gates and automation power sourcing;
- The reduction in groundwater pumping requirements along Lateral D;
- The reduction in lift station pumping requirements from upstream of Lateral D to deliver water to Lateral D;
- The reduction of fossil fuel use through decreased vehicle operations along Lateral D.

100% of all Rubicon FlumeGates and SlipMeters (described previously) supplied for this project will not be using supplied conventional power nor generator power and will not be tied to the grid in any way. Rubicon gates and meters are powered using solar panels and lithium battery sets; the power generated is sufficient to run the gates' motors, sensors, RTU, and communication system. Depending on the gate size and communication device, Rubicon gates and meters incorporate 80W to 120W solar panels as part of their standard configuration.

The greenhouse gas emissions from a gallon of gasoline are about 8,887 grams CO_2/ gallon. PIDD zanjeros (irrigation system ditch rider) will typically drive a canal a minimum of 6 times a day for operation and maintenance. Lateral D automation and total channel control will reduce operation of the turnout and check gates for water deliveries, requiring less field attention in the canal for operation's-based activities. Assuming that the reduction is approximately 60%, below is the calculation for the greenhouse gas emission reduction volume:

*8 miles round trip to project site * 1 gallon/15 miles * 6 times/day * 365 day/year * 8,887 grams of CO_2/gallon = 10,380,016 grams CO_2/year = 10.38 metric tons CO_2/year*

*~ 60% Reduction = 60% * 10.38 metric tons CO_2/year = 6.23 metric tons of CO_2 saving annually*

- **Any expected reduction in the use of energy currently supplied through a Reclamation project.**

Currently, the power source for the District comes from Hoover Dam (35%) and natural gas (65%). It is anticipated that natural gas will be the main source of power in the future.

Water conserved will be in a proportional amount of reduced groundwater use and associated pumping and energy use. These reductions in demand will also reduce the load on the Federal Hydro Power System affected by the drought.

- **Anticipated benefits to other sectors/entities.**

Reductions in demand will also reduce the load on the Federal Hydro Power System affected by the drought. Reclamation is faced with several challenges associated with the reduced power generation and need to meet contractual requirements including those for Indian Tribes regionally. Again, this project will help and can be used as an example of direct benefit to others.

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water efficiency project (e.g. reduce pumping).

- **If quantifiable energy savings is expected to result from the project, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.**

Yes, and the energy savings associated with water conservation are quantifiable. Water conserved will be in a proportional amount of reduced groundwater use and associated pumping and energy use. These reductions in demand will also reduce the load on the Federal Hydro Power System affected by the drought.

The greenhouse gas emission saved from pumping is approximately 901.08 metric tons of CO_2 saving annually.

The greenhouse gas emissions saved from traveling vehicle are approximately 6.23 metric tons of CO_2 saving annually.

The emissions per gallon of gas: U.S. Environmental Protection Agency. (2022, June 30). *Greenhouse Gas Emissions from a Typical Passenger Vehicle*. US EPA. Retrieved July 14, 2022, from https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#burning

The power that service well pumps are fueled by Hoover Dam and natural gas. The metric tons of carbon dioxide emissions per MWh generation used is according to the U.S. Energy Information Administration (EIA).

- **How will the energy efficiency improvement combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions.**

Water conservation and SCADA controls will require less man hours on the canal banks for operation and maintenance. This results in less vehicular travel time hours on the canal banks and a reduction in greenhouse gas emissions.

For energy saved due to less vehicle traveling: The greenhouse gas emissions from a gallon of gasoline are about 8,887 grams CO_2/ gallon (EPA). PIDD zanjeros (irrigation system ditch rider) will typically drive a canal a minimum of 6 times a day for operation and maintenance. Lateral D automation and total channel control will reduce operation of the turnout and check gates for water deliveries, requiring less field attention in the canal for operation and maintenance activities. Assuming that the reduction is approximately 60%, below is the calculation for the estimated greenhouse gas emissions reduction:

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- **If the project will result in reduced pumping, please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements and energy usage?**

For energy saved due to less pumping: Well production contributing to Lateral D includes 10 Wells approximately including upgrade. According to PIDD, the power utility's only fossil fuel energy source is natural gas and per U.S. EIA, natural gas creates 0.4107133435525439 metric tons of carbon dioxide emissions per MWh generated. Average energy required is approximately 735 kWh per ac-ft. Lateral D uses 27,134 ac-ft annually and the automation and total control channel will reduce approximately 11% of required flow for Lateral D. This means that the well usage will be reduced up to 2,985 ac-ft (11% of 27,134), therefore reducing power up to 2,193,975 kWh (735 kWh * 2,985 ac-ft) or 2,194 MWh annually.

*CO_2 emitted = 0.4107 metric tons/MWh * 2,194 MWh = 901.08 metric tons of CO_2*

- **Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.**

Yes, the energy savings estimate originates from the point of diversion at the Gillespie Dam. Flows in the Main Canal are pumped through a high flow low lift pump station from the dam storage pool into the elevated Gila Bend Main Canal. There are an additional 2 similar low head high flow lift stations required to convey flows in the Main Canal to the Lateral D heading. In addition, groundwater augmentation flows are pumped vie wells into the canal system.

- **Does the calculation include any energy required to treat the water, if applicable?**

There is no treatment of the conveyed irrigation water by PIDD. Private landowner on-farm drip systems or center pivots for example may use energy to filter and pressurize water.

- **Will the project result in reduced vehicle miles driven, in turn reducing greenhouse gas emissions? Please provide supporting details and calculations.**

Water conservation and SCADA controls will require less man hours on the canal banks for operation and maintenance. This results in less vehicular travel time hours on the canal banks and a reduction in greenhouse gas emissions.

For energy saved due to less vehicle traveling: The greenhouse gas emissions from a gallon of gasoline are about 8,887 grams CO_2/ gallon (EPA). PIDD zanjeros (irrigation system ditch rider) will typically drive a canal a minimum of 6 times a day for operation and maintenance. Lateral D automation and total channel control will reduce operation of the turnout and check gates for water deliveries, requiring less field attention in the canal for operation and maintenance activities. Assuming that the reduction is approximately 60%, below is the calculation for the estimated greenhouse gas emissions reduction:

*8 miles round trip to project site * 1 gallon/15 miles * 6 times/day * 365 day/year * 8,887 grams of CO_2/gallon = 10,380,016 grams CO_2/year = 10.38 metric tons CO_2/year*

*~ 60% Reduction = 60% * 10.38 metric tons CO_2/year = 6.23 metric tons of CO_2 saving annually*

- **Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).**

100% of all Rubicon FlumeGates and SlipMeters (described previously) supplied for this project will not be using supplied conventional power nor generator power and will not be tied to the grid in any way. Rubicon gates and meters are powered using solar panels and lithium battery sets; the power generated is sufficient to run the gates' motors, sensors, RTU, and communication system. Depending on the gate size and communication device, Rubicon gates and meters incorporate 80W to 120W solar panels as part of their standard configuration.

C. Sustainability Benefits

Enhancing drought resiliency.

- **Does the project seek to improve ecological resiliency to climate change?**

Yes. This project will help conserve water that would otherwise be lost due to evaporation, operational losses, and seepage. Conserved water stored and available for other uses results in improving the ecological resiliency for habitats, endangered species, and agriculture, yielding diverse and higher value crops. This project will aid in delivering water equitably to surrounding agriculture, communities, and habitats. Water savings also reduce the need to fallow lands that results in more airborne fugitive dust and ecological impacts associated with airborne particles. The project will also help reduce demand for carbon-based energy generation that helps to reduce greenhouse ecological impacts and improves air quality.

- **Will water remain in the system for longer periods of time? If so, provide details on current/future durations and any expected resulting benefits (e.g., maintaining water temperatures or water levels).**

Yes. Arizona is currently amid a Federal declared Tier 1 water shortage on the Colorado River System, and potentially a Tier 2 declaration in the near future. With the current state of this impending drought, eroded and aged gates (that require manpower) make water deliveries complicated, lacking precision and intensifying water loss. Currently, excess water is lost to the ephemeral washes, or sits at the base of fields, unable to be used, when that water could potentially stay in the system or provide water to an area that is in need. With the use of the Rubicon Total Channel Control flow measurement and SCADA control, the technology will measure water velocity, maintains water levels, minimize head losses, while potentially reaching zero spill, thus allowing water to stay in the system for longer periods of time. This project allows the water to maintain a constant flow regardless of upstream and downstream levels, and as a result helps maintain the temperatures of the water profile in the canal network.

- **Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of recreational, or economic importance)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project or is subject to a recovery plan or conservation plan under the Endangered Species Act (ESA).**

Yes. The project will help leave water behind Lake Powell and Lake Mead, which benefit species from as small as blister beetles to as large as oleander trees. Multiple endangered species specific to Maricopa County will have a better chance at survival, such as Arizona agave, the Arizona cliffrose and even the Arizona bald eagle that tends to make its debut in the fall and linger throughout summer. Other species such as Alfalfa caterpillars soon metamorphose into vibrant yellow butterflies that pollinate the surrounding fields, while woodpeckers, owls and federally protected turkey vultures migrate through these lands, stopping for a sip of water or a bite to eat from the surrounding vegetation. Turkey vultures are vital to this ecosystem, as they help control and prevent disease that could otherwise be spread to livestock/vegetation through flies and carcasses.

Arizona's state bird, the Cactus Wren, is a year-round resident to the county. These species, to name a few, will reap the benefits of this project by having access to reliable water that makes the entire ecosystem flourish.

- **Please describe any other ecosystem benefits as a direct result of the project.**

This irrigation system feeds fields of alfalfa and quenches the thirst of several species. These alfalfa crops are used as feed for the neighboring dairy farms in Maricopa County, that then supply food to the community. With the fulfillment of this project, crops can thrive, yield more product, and remineralize surrounding soil, while cultivating an entire biodiverse ecosystem within its boundary. The project will improve air quality due to the absence of fossil fuels required for pumping and farming practices. This will also aid in the reduction of maintenance and reducing vehicle use on sight, which also helps reduce fugitive dust and fossil fuels emissions from vehicles.

- **Will the project directly result in more efficient management of the water supply? For example, will the project provide greater flexibility to water managers, resulting in a more efficient use of water supplies?**

Yes. The ability to accurately control the flow of water to farms and open channels, results in reliable, near-on- demand water supply. This improves water management, flexibility, and conservation, minimizing spills and flooding. More efficient water practices help meet the needs of the PIDD growers, benefits native plants and species and supports Reclamation objectives. Flexibility is gained through the use of additional water stored actively in the canal system, and long-term water stored either leave that water in the aquifer or behind Lake Mead in addition to renewable energy adding to the reliability of electrical power supplies for irrigation.

Addressing a specific water and/or energy sustainability concern(s).

- **Explain and provide detail of the specific issue(s) in the area that is impacting water sustainability, such as shortages due to drought and/or climate change, increased demand, or reduced deliveries.**

The daunting issue at hand regarding water sustainability for the entirety of the agricultural community in the region is the historical major drought and climate change. The extreme more than 20-year long drought is now pressing at the door of many farmers and communities like Gila Bend and the PIDD with reduced available surface water supplies. As surface water availability decreases, groundwater consumption continues to increase to meet local demands.; this can be considered an increased demand on surface water by Reclamation to sustain levels in Lake Mead. Groundwater pumping augmentation can lead to increased negative impacts such as degradation of riparian areas, land subsidence with ensuing property destruction and reduction in groundwater quality.

Furthermore, 40 percent of the freshwater we have is being used to cool power plants in the Western United States. Maricopa County's electricity comes from 50% natural gas and 44.2% nuclear energy. To produce 1 megawatt of nuclear power requires a median of 669 gallons of water for cooling. For natural gas, a median of 385 gallons of water is used. Often after this water is used, it is sent back to the environment, increasing the risk of chemical contamination, and heat related deaths for fish, and plankton causing further ecosystem stressors. To note, this does not include water used to obtain the fuel, maintenance, or generate the power, which can be significant.

Further, dry vegetation and soil ignite wildfires all throughout the west, polluting the air with smoke and causing health concerns. As of June 12, 2022, 682 wildfires have burned over 45,000 acres in Arizona. 100% of people in Maricopa County are affected by drought. These challenges make it increasingly difficult to balance the needs of people, agriculture, and wildlife that depend on healthy, flowing water. This project will help conserve water in canals which will improve water management and energy sustainability in Maricopa County.

- **Explain and provide detail of the specific issue(s) in the area that is impacting energy sustainability, such as reliance on fossil fuels, pollution, or interruptions in service.**

With a population of just under 4 million people, Maricopa County is the fastest growing county in the United States. While Maricopa County contains 62% of Arizona's population, rapid population growth results in limited resources, energy, and severe water stress.

Furthermore, the reliance on fossil fuels have magnified the effects of climate change, polluting the ozone further- resulting in poor air quality. Dust, CO_2 pollution carried over by neighboring cities, and wildfires raging in the west contribute to the polluted air. In fact, Maricopa County earned another "F" rating in air quality from the American Lung Association. Extreme heat caused from climate change has amplified the harmful effects of air pollution, putting people at risk of heat related emergencies and even death. According to 2020 Maricopa County heat data, 82% of indoor deaths had an A/C unit, though 69% of the A/C's were non-functioning, and 31% were not in use. These energy insecurities also result in direct health consequences such as unsafe lighting and heating sources which may expose people to carbon monoxide and other unsafe conditions.

The exploitation of resources (due to climate change) has caused many energy-related sustainability concerns. With the drought in full effect, energy is a high demand; from pumping more water, to running A/C and cooling systems to the brink of destruction. Water is not as abundant as it once was, affecting almost everything in the environment around us.

- **Please describe how the project will directly address the concern(s) stated above. For example, if experiencing shortages due to drought or climate change, how will the project directly address and confront the shortages?**

Controlling the delivery of water in irrigation channels with Rubicon gates will reduce the loss of water, while improving the reliability, flexibility, and timeliness of supply. Not only will this help with the conservation of water, but it will lessen the need for human involvement which will result in minimal use of vehicles on site, minimizing dust/air pollution, and the use of fossil fuels. With this project, water can be easily managed remotely, keeping track of water levels and temperatures to better serve the rapidly growing population in addition to collecting water measurement and delivery data to be used by PIDD management.

- **Please address where any conserved water as a result of the project will go and how it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.**

The conserved water resulting from the project will help reduce additional water supply needed and water conserved may be help store water behind Lake Powell and Lake Mead reducing diversions from the Colorado River. It also may partially or in whole offset groundwater pumping for agriculture locally. Conserved water could potentially serve some ecological benefits including, recharge of water, return of flora/fauna, and encouraging water science careers. Ultimately water left in the basin storage can be used to offset groundwater pumping, made available for transfer, left in the river system, or used for some other beneficial use.

- **Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.**

Because of the hydraulic connectivity of surface water supplies, local groundwater, and the PIDD service area the mechanism to be used will be a water accounting exercise that supports the District water and energy objectives. PIDD as part of the planned System Optimization Study and working Water Management and Drought Mitigation Planning will use a measurement and accounting approach to manage water supplies.

- **Indicate the quantity of conserved water that will be used for the intended purpose(s).**

This project will recover approximately 2,985 acres annually. The conserved water resulting from the project may partially or in whole offset groundwater pumping for agriculture locally or may remain as stored water behind Lake Mead reducing diversions from the Colorado River.

Other project benefits.

(1) Combating the Climate Crisis:

- **Please provide specific details and examples on how the project will address the impacts of climate change and help combat the climate crisis.**

This project will address the impacts of climate change and help combat the climate crisis by making it a priority to use a "Best Practices" mindset. We are conserving, protecting, and restoring our natural resources (water and subsequent watershed and habitats) using a variation of water conservation activities as discussed in this grant document. Working water and energy nexus between PIDD and the local farmer/growers allows us to collaborate and strategize plans to address the climate crisis through new and innovative agriculture conservation and management activities. We are identifying On-Farm projects, regarding the 30 by 30 initiative with NRCS and USDA, in efforts to reduce carbon emissions and promote biodiversity, especially with riparian areas and watersheds that border our district. We are also identifying system components that can utilize solar energy. The effects of drought and climate change can be fought by better cultivating crops, creating soil moisture holding soils, and supporting ecosystems to thrive.

This project will reduce climate pollution created by reducing agricultural greenhouse gas emissions (10% of US total released) by reducing operation and maintenance time required by on-site vehicles through the use of solar powered SCADA units to reduce carbon emissions.

Protecting public health: According to the CDC effects from Climate Change include increased incidence of respiratory and cardiovascular disease, injury, and death due to extreme weather events, heat wave, droughts and floods causing losses to property and crops and change in food distribution, water-borne illnesses, and mental health (CDC). This is especially true in rural, underserved, low-income populations such as ours. This project would:

1) Improve air quality by reducing carbon emissions through use of solar powered SCADA units and reduced O&M time requiring on-site vehicles and dust generated from dirt roads.

2) Reduce risk of biological contamination by automated controls to reduce incidence of spills, overflows, and flooding.

3) Reduce cumulative effects from poor health (Type 2 Diabetes, Respiratory and Cardiovascular diseases).

4)Reduce incidence of floods and damages to homes and farms.

- **Does this proposed project strengthen water supply sustainability to increase resilience to climate change?**

Yes. This project prevents leakage/ seepage and overflows/flooding/spills, improving the integrity of the delivery system. This also provides constant reliable water flow, improved quantity (water elevation) and improved water quality. These improvements will result in improved on-farm efficiency and crop production and less operational spills therefore strengthening water supply sustainability and helping to increase the resilience to climate change. The proposed project is in alignment with President Biden and DOI objectives and drought mitigation for the Lower Colorado Basin, resulting in less dust, less fallowed lands, and less lung respiratory disease locally and in the urban area increased by large monsoonal events.

- **Will the proposed project establish and utilize a renewable energy source?**

Yes, this project uses small scale component solar panel power systems to power all the in-channel check structures, turnout structure gates, and we are also identifying additional system components that can utilize solar energy.

- **Will the project result in lower greenhouse gas emissions?**

Yes. The proposed project harvests renewable energy, minimizes the reliance on fossil fuels, lowers greenhouse gas emissions as well as improves the operation and maintenance of district conveyance helping to maintain agriculture production that provides beneficial plants that also sequester carbon emissions.

(2) Disadvantaged or Underserved Communities:

- **Does the proposed project directly serve and/or benefit a disadvantaged or historically underserved community? Benefits can include but are not limited to: public health and safety through water quality improvements, new water supplies, new renewable energy sources, or economic growth opportunities.**

Yes. Western Maricopa County is a rural, low income, disadvantaged community because of its ethnic minorities, poverty level, and rural location. Urban sprawl from Phoenix and an influx in new residents (40% increase in 20 years), has unfortunately caused a large disparity between income, poverty, unemployment, and quality of life. Public health and safety will improve due to efficient groundwater use and economic growth opportunities are available resulting from reduced farming costs, allowing for more employment, and helping to create 2nd tier producers (value added products).

Further, Gila Bend is also adjacent to the Tohono O'Odham Nation San Lucy District which is a Native American disadvantage Community.

- **If the proposed project is providing benefits to a disadvantaged community, provide sufficient information to demonstrate that the community meets the disadvantaged community definition in Section 1015 of the Cooperative Watershed Act, which is defined as a community with an annual median household income that is less than 100 percent of the statewide annual median household income for the State, or the applicable state criteria for determining disadvantaged status.**

These improvements result in better managed water and improved water delivery and energy efficiency. Without these upgrades consequences such as shortfalls during severe drought conditions adversely effecting Tribal income from farming and land leases as well as tourism and recreation, additional groundwater pumping and energy consumption, and loss of riparian or watershed areas for traditional gathering and as habitat for native species, could occur.

Table 4 – PIDD Disadvantaged Community Variables

Paloma Irrigation & Drainage District Disadvantaged Community Variables			
Variable	**Gila Bend**	**Gila River Indian Tribe**	**Salt River Indian Tribe**
Population	1,955	14,260	7,386
Low income, high and/or persistent poverty	MHI[1] $41,500 37.5% Live in Poverty	MHI[1] $9,283 52% Live in Poverty	MHI[1] $31,852 22% Live in Poverty
High unemployment	6.1%	22.6%	5.9%
Racial and ethnic residential segregation, particularly where the segregation stems from discrimination by government entities	69% Hispanic 20% White 5% Native American 4% Other 3% Black	100% Native American or Family Members	100% Native American or Family Members
Linguistic isolation	69% Spanish Speaking	Spanish Speaking O'odham	Spanish Speaking O'odham
High housing cost burden and substandard housing	40% Substandard	90% Substandard	70% Substandard
High transportation cost burden and/or low transportation access	Limited Public Transportation	Limited Public/Tribal Transportation	Limited Public/Tribal Transportation
Disproportionate environmental stressor burden and high cumulative impacts	Poverty Level Magnify	Poverty Level Magnify 50% Type 2 Diabetes	Poverty Level Magnify 50% Type 2 Diabetes

Because of urban sprawl (many communities) create a wide income gap between inhabitants. MHI[1] = Median Household Income. US Census, American Community Survey, 2020.

- **If the proposed project is providing benefits to an underserved community, provide sufficient information to demonstrate that the community meets the underserved definition in E.O. 13985, which includes populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life.**

See Table 4. Population includes 69% Hispanics in Gila Bend and 100% Native American in the Tohono O'Odham Nation San Lucy District Community. They reside in a sparsely populated rural area, with little or no tax base to support their infrastructure. They are isolated by historically being considered less than equal as agricultural workers. The nearby Indian Reservation is also an underserved community and share PIDD's water resources.

(3) Tribal Benefits:

- **Does the proposed project directly serve and/or benefit a Tribe? Will the project increase water supply sustainability for an Indian Tribe? Will the project provide renewable energy for an Indian Tribe?**

Yes. This will help Reclamation maintain their trust responsibilities to the local Indian Tribes. Any water conservation measures that support the Colorado and Gila River basin and other small tributaries in this network system (Hassayampa, Agua Fria, Verde, and Salt Rivers) will help conserve water that the Tohono O'Odham Nation San Lucy District and Pima-Maricopa Indian Tribes need for their native wetland and riparian areas and water resources for residential, municipal, and agricultural use.

- **Does the proposed project directly support tribal resilience to climate change and drought impacts or provide other Tribal benefits such as improved public health and safety through water quality improvements, new water supplies, or economic growth opportunities?**

Yes. Saving water through better management (automation) allows for a small buffer of resiliency against possible state or federal mandated water quantity reductions due to drought or climate change. This project will improve the integrity of delivery system to prevent a series of issues such as leakage, seepage, overflows, flooding, spills, and improving both the quantity and quality of water. These improvements will also result in improved on-farm efficiency and crop production. Less water used leaves more in the river and in the groundwater for Tribes including the Tohono O'odham San Lucy District at Painted Rock Dam.

(4) Other Benefits: Will the project address water and/or energy sustainability in other ways not described above? For example:

- **Will the project assist States and water users in complying with interstate compacts?**

Yes. The PIDD Lateral D Modernization with Total Channel Control Implementation Project will serve as a regional example to others to reduce demands on the Colorado River and help others comply with their interstate compacts to increase water and energy efficiency.

The current severe drought conditions has led to the first ever Tier 1 shortage declaration on the Colorado River by Reclamation. With a continued drought and the high probability of a future declaration of a Tier 2 water shortage in the near future, any water saved and left behind Lake Powell and Lake Mead or in the groundwater basins will support drought resiliency and provide water supply to the parties of the Colorado River Compact and Mexico. This phased project will support the interstate compacts on several levels including the ability to reduce a small part of the system structural deficit by easing demands on Federal Water Storage Hydro Power.

- **Will the project benefit multiple sectors and/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)?**

Yes. The specific project benefits include:

- **Agricultural** – Economic (less water needed, less restriction on crop types, less danger of crop damage from overflows/flooding, reduce shortfalls, less energy needed for pumps, less danger or lawsuits or losses from bacterial contamination or flooding). Reduce O&M cost to PIDD so funding can be used for other deteriorating structures and sites. Enable downstream users off the Buckeye Main Canal to implement On-Farm improvements.
- **Environmental** – Prevent flooding/erosion of earthen canal/lateral, less noxious/ invasive weeds, less erosion, conservation support healthier ecosystem (Native plants, habitat, native species, and migratory birds). More viable washes/ springs.
- **Recreational/Tourism** – Gila River/Watershed, Salt River, Verde River, Agua Fria River, Hassayampa River, Improved off-roading/camping/hiking/photography/bird watching.
- **Cultural** – Protection and preservation of native gathering sites (plants and clay), ancient trails, village, or ceremonial site.
- **Food Safety** – Less produce contamination and catastrophic crop failure due better water elevation controls to prevent of overflows/flooding of fields with food crops.
- **Public Safety** – Less residual flooding from overflow and spillage resulting in unsafe driving conditions and erosion of road and ditch banks.

- **Will the project benefit a larger initiative to address sustainability?**

Yes. This project falls in line with the Federal USDA NRCS 30 X 30 initiative in protecting 30% of all land and water by 2030.

- **Will the project help to prevent a water-related crisis or conflict? Is there frequently tension or litigation over water in the basin?**

Yes. The project will help to prevent a water-related crisis or conflict by:

- Creating resiliency - Preventing water-related shortfalls or flooding
- Leveraging funding to conserve and better manage the water resources and increase efficiency of the system, thus reducing quantities delivered during drought.
- Improving water conservation of water delivery system to reduce water quantities.
- Reducing water quantities to allow water to be used by lower priority users that have shortfalls and mandatory water reductions during drought conditions.
- Reduce groundwater pumping and improve drought resiliency and basin dependence.
- Improving Tribal Relations

D. Complementing On-Farm Irrigation Improvements

PIDD continues to partner and work closely with NRCS and producers to work with our local growers. With strategic stepwise modernization of our irrigation systems, growers can then proceed with their own **On-farm improvements** funded by the U.S. Department of Agriculture (USDA)/Environmental Quality Incentives Program (EQIP). These partnerships between PIDD, NRCS, Federal Ag Agencies, BOR and producers are critical to our future. NRCS helps us plan and develop projects that complement each other, improving the overall system from diversions to the farm, especially in the Western states where drought, climate change and aging infrastructure greatly affect our daily operations. George Cairo Engineering is an NRCS Technical Service Provider (TSP) that engineers on-farm irrigation engineering as part of the EQIP support program.

If the proposed project will complement an on-farm improvement eligible for NRCS assistance, please address the following:

- **Describe any planned or ongoing projects by farmers/ranchers that receive water from the applicant to improve on-farm efficiencies.**

  - **Provide a detailed description of the on-farm efficiency improvements.**

PIDD is working with our local NRCS office to develop a Conservation Implementation Strategy for water conservation improvements for our agricultural fields.

These irrigation efficiency improvements include:

1) Eliminating seepage issues from earthen field ditches and deteriorated concrete ditches.
2) Installing larger capacity concrete ditches containing high-flow turn-out structures.
3) More closely matching water volume to field dimensions and soil intake qualities.
4) Installing drip irrigation where practical and cost effective.

Water Conservation and Cost Savings to farmers:

1) Reduce water volume requests due to more reliable and faster flow rates (enlarged ditches).
2) Reduced water volume requests if drip lines used instead of flood irrigation.
3) Reduced water volume requests due to lining ditches or repairing concrete (reduce seepage and transpiration).
4) Reduced water volume requests due to more accurate field data (size and soil intake characteristics).
5)Estimate a 25% water savings based on these improvements.

  - **Have the farmers requested technical or financial assistance from NRCS for the on- farm efficiency projects, or do they plan to in the future?**

The following are example On-Farm Improvement Projects:

- Stotz Farms Drip System Project – Converted 1200 acres of surface irrigation into a Drip Irrigation System
- Sunset Farms Pivot System Project – Pivot Sprinklers with Remote Controlled Operations for 320 acres
- Sunset Farms Modernization Project – 3 Remote Controlled Weather Stations for irrigation water management

- Cutting Edge Farms Modernization Project - 2 Remote Soil Moisture Monitors to monitor soils for irrigation water management down to 48" deep and monitor root depth and adjust irrigation requirements based on actual conditions
- Cutting Edge Farms Modernization Project – 1 Remote Controlled Weather Station for irrigation water management

- **If available, provide documentation that the on-farm projects are eligible for NRCS assistance, that such assistance has or will be requested, and the number or percentage of farms that plan to participate in available NRCS programs.**

PIDD is working closely with District's growers and local NRCS to help plan for on-farm efficiency projects. One of the local growers, Sunset Farms is actively working to apply for technical and financial assistance through NRCS EQIP to improve and modernize their on-farm system. Sunset farms has held multiple meetings with its local NRCS staff and Rubicon to identify the programs FarmConnect fits into. NRCS staff are very excited to work with Sunset Farms and leverage the proven water savings when pairing the FarmConnect system with this District automation of Lateral D project.

- **Applicants should provide letters of intent from farmers/ranchers in the affected project areas.**

Letters of support from farmers and ranchers in the PIDD are available in the Appendix.

- **Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.**

In today's world of emerging agricultural technology there are many methodologies and technologies that are used to irrigate fields – flood, high-precision surface, pivots, sprinklers, drip irrigation, etc. – one thing all of these technologies have in common is the need for a reliable and steady water supply; some are more susceptible than others to variations in incoming flow and pressure.

Most commonly found in the Gila Bend region is gravity, or flood, irrigation. Advancements such as laser grading of sloping borders have made the water application more uniform, resulting in better distribution and overall efficiency. Well designed and managed gravity-fed surface irrigation systems have been proven to have the potential to deliver on-farm application efficiencies in excess of 85% and up to 95% on the right soils and field shapes and sizes. The application efficiency of sloping border irrigation is commonly limited through runoff (or tailwater) at the end of the plot or by water infiltrating into the soil below the plant's roots. By applying water at high flow rates, application uniformity can be increased, and both deep percolation and surface runoff can be reduced by modern technology like Rubicon Farm Connect works to maximize the efficiencies.

- **Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how? For example, installing a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip-irrigation. OR**

- **Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?**

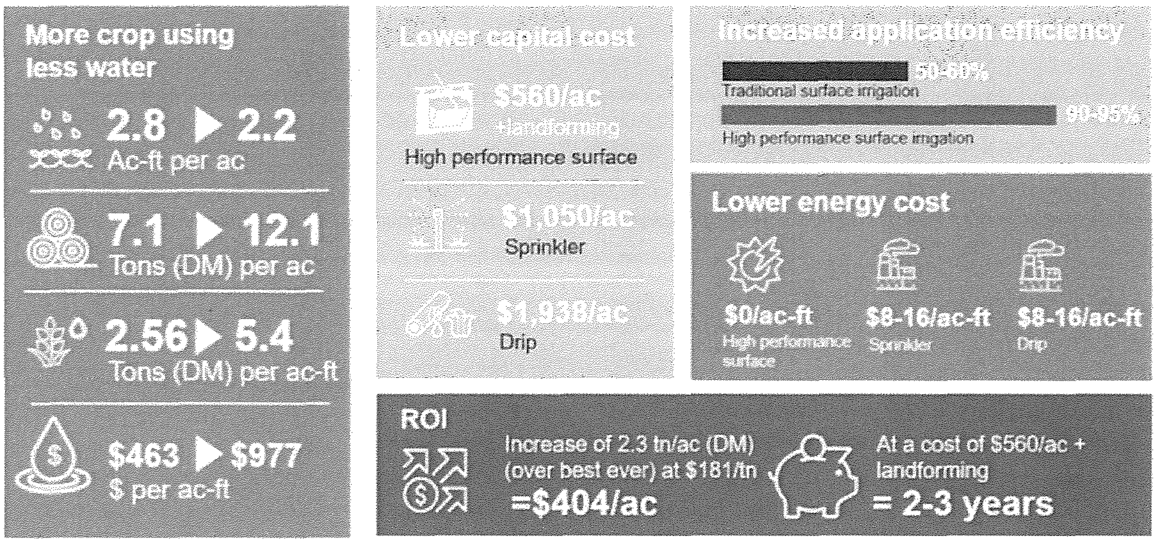
To irrigate sloping borders using high-performance surface irrigation, water must be supplied onto farms at steady high flow rates. In a manually operated canal system where ample freeboard must be met to allow for system safety, higher flow rates are very challenging to achieve as they require higher head pressures from deeper channel levels. Using Rubicon Network Control for canal automation, operators can maintain higher channel depths, which translate to higher available head and flow rates when applied to fields. Working in concert with the on-farm systems the new improved Lateral D will complement and improve on-farm efficiencies.

- **Describe the on-farm water conservation or water use efficiency benefits that are expected to result from any on-farm work.**
  - **Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.**

The Automation of Lateral D will facilitate our farmers desires to be more efficient with our water resources. However, without automation, these projects can not deliver the efficiency and savings needed to fund these new opportunities.

Evidence of achievable on-farm water savings with similar agronomic and climatic conditions to PIDD, are documented with the Imperial Irrigation District On-Farm Efficiency Conservation Program 2020 Solicitation (19-Jan-2022) which verified the on-farm water savings resulting on-farm conservation measures for one year to be 136,192 acre feet from 255,228 acres in the program, an average of 0.533 ac feet savings per year, with $29,553,718 paid out in funds from the program.

The technology for high performance surface irrigation (FarmConnect), being considered for on-farm projects within the service area of PIDD, has proven track results, not just in academic trials but practical, commercial farming including water savings of 0.6 ac-ft/ac/year. Russell and Cathy Pell of Victoria, Australia, operate a dairy and mixed cropping 2,000 acre property irrigated by border check surface irrigation, supporting a modern dairy milking a herd of 750. Since 2011 they have operated automated High Performance surface irrigation system to irrigate their corn crop (silage), pasture and alfalfa which included the automation of 80 x 5 acre bays. The benefits and financial success during the 2011-12 irrigation season with the corn crop (silage) included 20% water savings (0.6ac-ft/ac), 22% increased productivity (5tn/ac), doubling of dry matter production per acre (5.4tn per ac-ft), and revenue increase ($404/ac) with the capital investment of $560/ac which achieves a return of investment (ROI) in two - three seasons. The on-farm surface irrigation automation solution has achieved the following efficiencies:



Reference: Moller, P., (2019). 'Essential elements of High Performance Surface Irrigation'. *Western Alfalfa and Forage Symposium*, UC Cooperative Extension, Plant Sciences Department, University of California, Davis, CA. Nov 19-21 2019. Davis, CA

Reviewing a typical field within PIDD with border check irrigation and bays that are 186ft wide and 1,300ft long, using a modeling program called WinSRFR (ver5.1.1.9) developed by the USDA Arid-Land Agricultural Research Center, Maricopa, AZ, the simulation results show that 85% Application Efficiency with 86% Distribution Uniformity (DUlq) are achievable with high performance surface irrigation, with precision application of the flow rate from Paloma Irrigation and Drainage District (PIDD) and precise time to cut off allowing the correct volume of water applied to replace the soil moisture deficit and meet the peak crop water requirements.

These results are support by research projects where Rubicon partnered with the Australian Cotton Research and Development Corporation (CRDC) and the University of Southern Queensland (USQ) – Australia in the Rural R&D for Profit Program, to demonstrate that automation of surface irrigation with furrows, by replacing a manual system with siphons, can still achieve high application efficiencies of 85%+, but with similar yields as industry standard siphon irrigation, but without the labor. The project included extensive use of soil moisture sensors and interpretation of data, supplied by Rubicon.

Surface irrigation (be it by furrow or in bays) is the most common form of irrigation due to its low capital cost and low energy requirements. Well-designed and well-managed surface irrigation can achieve application efficiencies of 95%, showing that efficiency comes from design and management, and is not an inherent characteristic of the system itself. Smarter Irrigation for Profit trials showed that application efficiencies for surface irrigation can often be improved by better design and scheduling – reducing losses through deep drainage and run-off. Key measure; measure to manage. (Rural R&D for Profit Program). Evidence in the project found progressions like improved scheduling can produce step-changes in irrigation operations. The flow of irrigation water can now be controlled automatically from source to within a field. It relies on sensors and telecommunication to control automated equipment, permitting the remote control of irrigation through a computer or smart-phone interface. Coupling automation with precision scheduling packages ensures the resultant irrigation is optimal, not just the remote control of automated, poor practice.

Smarter Irrigation for Profit trialled automated systems across several commodities and irrigation systems. It found significant benefits to irrigators through convenience and time-saving, as well as improved irrigation practice. The work showed that highly automated, if not autonomous (self-controlling), systems are feasible and they have potential for continued development and wider application. Automation can be phased into a farm beginning with simple monitoring.

Reference: *Roth G (ed), Foley J, Gall L, Hills J, Jamali H, Jaramillo A, McAllister A, McCarthy A, Morris M, North S, Phelps C, Smith J, Trindall J, White M (2018) Smarter Irrigation for Profit. Final Report. Cotton Research and Development Corporation, Australia.*

High performance surface irrigation projects in USA include:

Ronald C. Leimgruber Farms (RCL Farms) On-Farm Automation - Holtville CA

Services Provided: On-farm automation for control of bay outlets, soil moisture monitoring solution, wetting advance sensors and metering with flow control, Rubicon Weather Station.
Media Reference:
https://irrigationleadermagazine.com/ronald-leimgruber-using-farmconnect-in-the-imperial-valley/

UC Desert Research and Extension Center - On-Farm Automation - Holtville CA

Services Provided: On-farm automation for control of bay outlets and furrow irrigation, soil moisture monitoring solution, wetting advance sensors, Rubicon Weather Station.
Media Reference:
https://irrigationleadermagazine.com/how-automating-furrow-irrigation-can-save-water-and-reduce-labor-costs/
https://irrigationleadermagazine.com/how-rubicons-farmconnect-solution-is-turning-flood-and-furrow-irrigation-into-an-efficient-system/

Russon Farms On-Farm Automation – Garland, UT

Services Provided: On-farm automation for control of pipe and riser valves, soil moisture monitoring solution, wetting advance sensors and metering with flow control, Rubicon Weather Station.
Media Reference:
https://irrigationleadermagazine.com/how-automating-furrow-irrigation-can-save-water-and-reduce-labor-costs/
https://irrigationleadermagazine.com/how-rubicons-farmconnect-solution-is-turning-flood-and-furrow-irrigation-into-an-efficient-system/

Russon Farms On-Farm Automation – Garland, UT

Services Provided: On-farm automation for control of pipe and riser valves, soil moisture monitoring solution, wetting advance sensors and metering with flow control, Rubicon Weather Station.

Media Reference:

https://irrigationleadermagazine.com/colton-russon-using-farmconnect-on-a-utah-dairy-farm/

- **Please provide a map of your water service area boundaries. If your project is selected for funding under this NOFO, this information will help NRCS identify the irrigated lands that may be approved for NRCS funding and technical assistance to complement funded WaterSMART projects.**

Refer to the Appendix for a map of the Paloma Irrigation and Drainage District Overall Map.

E. Planning and Implementation

Project Planning:

Does the applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? Does the project address an adaptation strategy identified in a completed WaterSMART Basin Study? Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place. Including a specific excerpt or a link to the planning document may also be considered where appropriate.

Provide the following information regarding project planning:

- **Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Drought Contingency Plan or other planning efforts done to determine the priority of this project in relation to other potential projects.**

This project has been in the planning stages for the last 5 years, but in 2018, this became a reality with Rubicon performing a scoping study to determine the feasibility and costs for modernizing our system. The study was reviewed and verified by George Cairo Engineering a local irrigation system modernization expert firm. The reason we have only installed a few gates is because we wanted to proceed cautiously, training our employees to understand and use this automated system. Plus, the costs are quite prohibitive. We are a small rural Water District and it is difficult for us to compete for the larger grants based on Water savings. However, if you compare the percentage of our water savings instead of the quantity it is quite high (14-25%). As our first small system modernization projects were successfully completed in phases, we are now ready to undertake a large-scale project installing ten new Rubicon Gate structures at critical junctures identified in our scoping study. We know we have developed a strategy to succeed. We will have the Engineering and Design component completed in December enabling us to start the project upon an anticipated Notice to Proceed.

This project entitled "PIDD Lateral D Modernization with Total Channel Control Implementation Project" is part of our overall goal to save water and increase efficiency in the District. In May of 2018, PIDD selected Rubicon Systems Australia Pty Ltd to conduct a Scoping Study for our water delivery system to help us develop a plan to modernize our aging infrastructure with state-of-the-art technology and their "tried and tested" Rubicon Gates (Copy provided in Appendix). We have already installed several of these structures/automated systems gates and again, all work was reviewed and validated by George Cairo Engineering, Inc (GCE). The District with the help of a Reclamation Grant and GCE is in the process of developing our System Optimization Report that will help us determine our opportunities, priorities and a phased plan to optimize our District and improve our resiliency to address the extended extreme drought.

Project Planning:

Each year, we identify and prioritize our system needs and problems, and projects not addressed in the previous year are added. Our criteria include:

1) Is the project (components) listed as a priority on our Capital Improvement Plan and Water Conservation Plan or in current studies?
2) Can the problem or need be remedied with existing resources and funds?
3) What benefits will occur from the corrective action taken (water/monetary savings, efficiency, sustainability, annual maintenance, crop losses, shortfalls, acre foot savings)?
4) Are additional resources and funds available if the existing funds are not available?

This project is a priority for PIDD and will help PIDD meet their goals of conserving water resources and generating renewable energy as part of their drought response and planned path to low carbon use. This project is in-line with an adaptation strategy identified in the WaterSMART Lower Basin Study.

- **Describe how the project conforms to and meets the goals of any applicable planning efforts and identify any aspect of the project that implements a feature of an existing water plan(s).**

PIDD evaluates and update their Water Plan as needed to strategically adapt to and plan for the current and future resources conditions that have drastically changed with the effects of the impending drought in the Basin. Strategies to improve conveyance efficiencies with total channel control and automation and on-farm water use along with development of a path to low carbon footprint are priorities in the plan. This project specifically because of its nexus to water and renewable energy has been identified as a priority and is endorsed strongly by PIDD Board Members. Further, the District with the help of a Reclamation Grant and GCE is in the process of developing our System Optimization Report that will help us determine our opportunities, priorities, and a phased plan to optimize our District and improve our resiliency to address the extended extreme drought.

- **If applicable, provide a detailed description of how a project is addressing an adaptation strategy specifically identified in a completed WaterSMART Basin Study or Water Management Options Pilot (e.g., a strategy to mitigate the impacts of water shortages resulting from climate change, drought, increased demands, or other causes)**

Yes. This project is addressing an adaptation strategy identified in the Basin Study including Changes to Agricultural Practices and Land Use (Improve Irrigation Efficiency) and Supply and Infrastructure Investments (New Infrastructure Water and Energy Supplies). Adaptive management in the Water Plan calls for development of projects that will conserve water for drought resilience and development of projects that are in-line with low carbon footprint goals. The plan further identifies as a goal working with the farmers to encourage less water intensive crops and improve irrigation efficiency, as they need to evaluate and apply new technologies to help meet goals set forth by the District. This proposed project specifically is in-line with the WaterSMART Basin Study strategy to mitigate the impacts of water storages resulting from climate change and drought.

Project Readiness:

- **Identify and provide a summary description of the major tasks necessary to complete the project. Note: please do not repeat the more detailed technical project description provided in Section D.2.2.2. *Application Content.* This section should focus on a summary of the major tasks to be accomplished as part of the project.**

Ideally, PIDD would like to start construction in Fall of 2023, but unless we receive the Award and NTP in May of 2023 from USBR, this is unlikely due to long lead items and finalization of engineering design.

PIDD Staff will be utilized for specific tasks during this currently scheduled 2.5-year project. Construction will occur during the Mid-October to Mid-December. Approximately 20% will be constructed in Fall 2023, 40% will be constructed in Fall 2024, and the last 40% will be installed in Fall 2025. Contractors will be working regular workday hours; no overtime is anticipated on this project.

Implementation Plan:

Once the Categorical Exclusion is completed and we receive the NTP, we will begin initial planning. An Action Plan will be developed that lists each task, scheduled interval, responsible party, comments/notes and when the activity or task is completed and by whom. A project Gantt chart that is resource loaded with critical path items identified in the work plan will also be completed. Major phases will include:

Pre-Construction:

- Contractor Selection and Vendor Procurement and Award for
- Engineering/Design (site area design for each turnout and check structure)
- Contractor: Civil contractor and concrete structure (forms, attachments, support structures)
- Materials/Supplies (Order Rubicon Gate & System Controls – May need 16 weeks lead time)
- Final planning, construction phasing, measurements, scheduling, shop drawing reviews, mobilization of equipment, gate fabrication, all non-construction activities that can be completed to be ready.
- Project Manager/Water Master Coordinate/schedule with affected water user(s) for Dry-out

Construction/Installation:

- Contractor/PIDD Mobilization
- Site Preparation by PIDD Equipment Operator Project Manager/Water Master Supervise Fabrication of gates Rubicon/PIDD (GCE Inspection)
- Precast structure at each site by Contractor/PIDD (GCE inspection)
- Electrical work at each site by Contractor/Rubicon (GCE inspection)
- Precast structure installation by Contractor/PIDD (GCE inspection)
- Gate Installation (Attach to concrete structures) by Contractor/PIDD (GCE inspection)
- Project walk through
- Final grading and clean up
- Demobilization

Post-Construction:

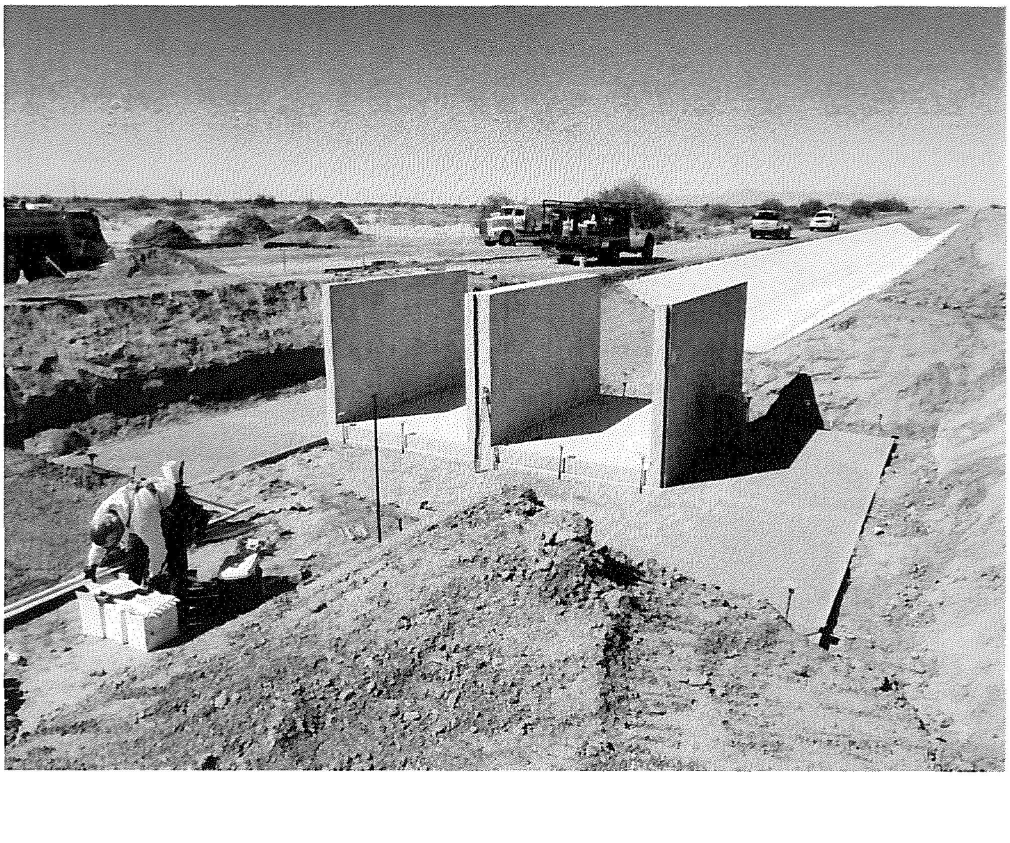
- Installation/testing of automation systems/controls (All work activities not requiring Dry-out)
- Lessons learned

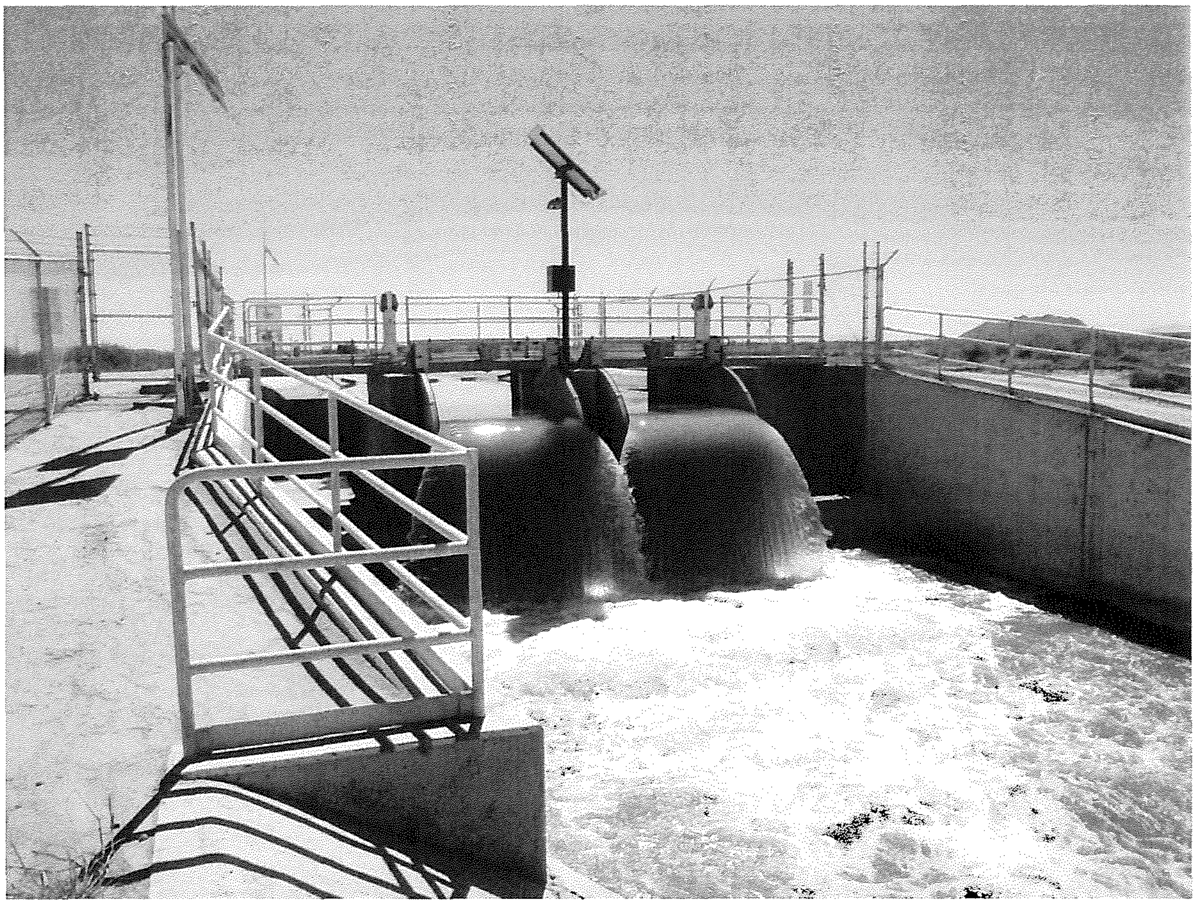
Closeout/Reports:

- As required (Progress Reports - Semi-Annual).
- Final report with documentation

Photos of Example Automated Measurement Devices

Below is example of successfully completed Rubicon Gates/Structures with Automation/ Controls installed locally. Also, a newly installed remote controlled/monitored Well/Pump (Crop Link by Agsense) that will work in conjunction with our Rubicon gates.





- **Describe any permits that will be required, along with the process for obtaining such permits.**

No known permits, all work planned will be completed within the District easements.

- **Identify and describe any engineering or design work performed specifically in support of the proposed project.**

The proposed project associated with this WEEG application is a priority project for the District and as such preliminary schematic engineering, planning, and scoping was completed by George Cairo Engineering, Inc., and Rubicon Water to identify the required replacement, design criterion, gate selection, and environmental requirements. Work was completed to develop the project cost and schedules submitted in this grant application.

- **Describe any new policies or administrative actions required to implement the project.**

No new policies are required to implement the project. The District Board passed an administrative resolution in support of the project and funding; a copy of the document can be found in the appendix.

- **Please also include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. Milestones may include, but are not limited to, the following: complete environmental and cultural compliance; mobilization; begin construction/installation; construction/installation (50% complete); and construction/installation (100% complete). Was the expected timeline for environmental and cultural compliance discussed with the local Reclamation Regional or Area Office?**

Upon receipt of the Reclamation letter of award, the District anticipates implementing the following schedule. Construction start date will not occur prior to May 2023.

Table 5 – Tentative Milestone/Task Schedule

Milestone/Task	Planned Start Date	Planned Completion Date
BOR Notice of Award	1/1/23	1/31/23
BOR Notice to Proceed & Contract Execution (Contract, PASS, ASAP, etc.)	1/1/23	5/31/23
BOR NEPA Review (Complete NEPA process (Categorical Exclusion))	1/1/23	5/31/23
Permits (None anticipated, but if needed, this will be completed)	1/1/23	5/31/23
Engineering Design and Consultation (Finalize Design and Environmental)	2/1/23	6/30/25
Order Long-Lead Items (Rubicon Gates and Materials)	4/1/23	9/30/23
Pre-Construction (Procurement, Bid Selection, Pre-construction Activities)	7/1/23	9/30/23
Construction & Installation 20% (Fall 2023 Construction, Inspection, & Commissioning)	10/15/23	12/15/23
Semi-Annual Project Report (Prepare report and submit to BOR)	12/1/23	12/31/23
Pre-Construction (Pre-construction Activities)	7/1/24	9/30/24
Semi-Annual Project Report (Prepare report and submit to BOR)	7/1/24	7/31/24
Construction & Installation 20% (Fall 2024 Construction, Inspection, & Commissioning)	10/15/24	12/15/24
Project Report (Prepare report and submit to BOR)	12/1/24	12/31/24
Pre-Construction (Pre-construction Activities)	7/1/25	9/30/25
Semi-Annual Project Report (Prepare report and submit to BOR)	7/1/25	7/31/25
Construction & Installation (Year 2.5 Construction, Inspection, & Commissioning)	10/15/25	12/15/25
Completion and Final Report (Closeout activities and final report submittal to BOR)	12/1/25	12/31/25

F. Collaboration

Please describe how the project promotes and encourages collaboration.

- **Is there widespread support for the project? Please provide specific details regarding any support and/or partners involved in the project. What is the extent of their involvement in the process?**

Yes, this project demonstrates collaboration between Reclamation and PIDD, NRCS and the PIDD, PIDD and upstream water districts, and also our water district and our agricultural users. It can be used as an example to other water managers in Arizona reflecting how assessment, planning, usage, need, and corrective measures can be achieved to benefit a district in a limited resource environment. Even though the costs for modernizing irrigation systems can be prohibitive, we demonstrate that we can slowly upgrade and modernize our gates/controls and automate our systems, a few at a time. Our water users have been involved in coordination of the project and prioritization of the D Lateral, and they are incredibly supportive of any funding we receive to help improve our system. They actively participate and support our water conservation methods because not only is it good for our soil and water resources it also provides them a cost savings, especially with labor costs increasing and becoming more difficult to locate and retain.

The Paloma Irrigation and Drainage District canal system was the largest privately funded irrigation project in Arizona history, costing private owners about $2 million in 1919. Later in 1920, Frank Gillespie, a local rancher built the 1,700 LF Gillespie Dam to help provide water for irrigation. This community has practiced self-reliance for many decades, but now with the high costs of improvements, water shortfalls, and increased operating costs, we must seek ways to leverage funding from grants or develop creative strategies to continue to provide our much needed services for this area. Also, our collaboration and support from Reclamation is vital to our success in support of the goals of this NOFO and the Biden Administration.

- **What is the significance of the collaboration/support?**

The significance of the collaboration and local support is very impactful to the success of the District and this project, without this support we could not move forward with this project.

Our collaboration efforts are an ongoing process with our stakeholders (landowners, growers, our District Board). We also help facilitate interaction with the NRCS and our District growers. PIDD as well as our growers strongly support this project, and they want it done ASAP. They feel that with the consultation with George Cairo Engineering, Inc., Rubicon, and prior successful Reclamation grants, this next phase in this multi-phased process should easily follow.

Our partnership with our landowners, growers, and water users is demonstrated in several ways:

1) Voluntary seasonal fallowing program to support drought impacts.

2) Irrigation methods that promote water use reduction (sprinklers, drip, etc.).

3) Crops that require less water.
4) Helping fund District O & M costs (Percent of fallowing and $25/acre).
5) Strategies/Support/approval for proposals/grants that require matching funds.
6) Creating a mutually beneficial partnership that improves efficiency and reduces costs.
7) Creating the framework for addressing and responding to incidents (ranging from routine to emergencies).

- **Will this project increase the possibility/likelihood of future water conservation improvements by other water users?**

Yes, PIDD management participates in multiple arenas to network professionally with other water district in Arizona and there is lots of interest in our approaches and plan to modernize. This PIDD project will serve as a regional example for other water users to improve water efficiency and energy management especially when coupled with the NRCS supported on-farm technology applications this overall project should be a showcase.

- **Please attach any relevant supporting documents (e.g., letters of support or memorandum of understanding).**

Please refer to the Appendices Section for Letters of Support.

G. Additional Non-Federal Funding

State the percentage of non-Federal funding provided using the following calculation:

$$\frac{\text{Non-Federal Funding} = 51\%}{\text{Total Project Cost} = \$4{,}071{,}896.87}$$

Our funding will be the 50% from our District's Account and In-Kind services. The In-Kind services will include our Labor and expenses, and use of our Heavy Equipment. This project is required to be constructed while the system if kept in service for the water users during their year-round growing season. The district will also have the overall administration and coordination of the project as part of our In-Kind services.

We are taking a more conservative approach, so we can leverage funding and resources from ourselves as well with the USBR in a step-by-step process. **Without this funding we cannot only proceed** very slowly, even with our Capital Improvements funds, this would take all our funding for other projects away for at least five years and delay the project significantly. This would put the PIDD's system at considerable risk, diverting all our funds to only one project. The 50% matching funds help tremendously for these costly projects.

H. Nexus to Reclamation

This project is connected to Reclamation Basin Objectives and activities for improving efficiency and conservation of the water systems in the Basin including PIDD.

Describe the nexus between the proposed project and a Reclamation project or Reclamation activity.

- **Does the applicant have a water service, repayment, or operations and maintenance (O&M) contract with Reclamation?**

Yes, the PIDD receives Reclamation Project Water via the Gillespie Dam Lift Station that is filled by the City of Phoenix 91st Avenue WWTP Effluent that is linked to Reclamation via a water service contract.

- **If the applicant is not a Reclamation contractor, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means?**

Yes, the PIDD receives Reclamation Project Water via the Gillespie Dam Lift Station that is filled by the City of Phoenix 91st Avenue WWTP Effluent that is linked to Reclamation via a water service contract.

- **Will the proposed work benefit a Reclamation project area or activity?**

Yes, the Gila River provides 25% of the PIDD's water supply. It contributes water to the Lower Colorado River Basin (Confluence of Colorado River in Yuma) and linked to GRIC and State of Arizona water supplies and storage behind Lake Mead. The project will benefit the Basin regionally and at the Lake level by reducing demands on the Gila River which reduces demands on the Colorado River and Lake Mead. Additionally, this project would benefit the Federal Hydro Generation and associated contracts impacted by the drought.

- **Is the applicant a Tribe?**

No, but there is benefit to the ancestral lands of the Hohokam, Pima, Maricopa, Opa (Protected) and the Tohono O'odham Nation San Lucy District near Painted Rock Dam. Water conservation measures and improvements help protect native plants, wildlife, and habitat that are culturally significant to the Tribes.

1.5 Performance Measures

Pre-project Estimation:

Inflow/Outflow: Data is collected whenever water is released. This is incorporated into our data base. We can generate reports for early and late seasons adding the ratio of acre-feet diverted to acre-feet received to calculate efficiency. Current measurement has assumed accuracy error of 5 to 20 percent due to means and methods and system physical performance due to varying water levels.

Post-Project Methods:
Pre-project results will be compared with post-project results to calculate water savings. This will be improved with the new SCADA improvements. We will compare the ratio of acre-feet diverted to acre-feet received to calculate overall system efficiency. New Rubicon devices have a certified accuracy of plus or minus 2.5 percent when installed properly. The performance measure will be the results of this flow measurement versus preconstruction and they will be field validated for both pre and post and results document. The goal would be to improve on the flow measurement and delivery accuracy to be at a minimum plus or minus 5 percent.

Measuring Devices:
The Rubicon FlumeGate includes the following items:

- The FlumeGate® constructed out of marine grade aluminum is a precision overshot leaf flow measurement and flow control gate that measures fully submerged flows (90 percent) and mounts directly into a flow control structure gate bay.
- Each gate comes as a complete turnkey installation, equipped with a control pedestal which includes a standard processor and keypad for automation, solar panel power system and a 16 ft mast for mounting of a communication antenna.
- One aluminum external mounting frame, c/w stainless steel anchors, Hilti epoxy and SIKA sealant.

The SlipMeter includes the following items:

- The SlipMeter is a precision flow control and flow measurement gate that measures fully submerged flows (and partial-full flow in partial-full models) and mounts directly to a turnout headwall with no straight pipe requirements.
- The SlipMeter comes equipped with an internal and external frame c/w stainless steel anchor, epoxy capsules and polyurethane sealant.
- Each SlipMeter comes equipped with a separate standalone control pedestal which includes a display and keypad, solar panel power system and a 16 ft mast for mounting of communication antenna: RTUs, radio and antenna by others.
- The SlipMeter comes complete with an integrated power supply comprising an 85W solar panel, a solar regulator, and a 48Ah 12-volt deep cycling battery pack. Note, the batteries must be removed from the meter and charged if the gates are not installed within four weeks of delivery.
- Standard Rubicon local controller software, including automatic local/remote flow control mode, local/remote gate position mode and local manual mode.

Measuring Devices:

- One 12-volt DC deep cycling battery pack. Each pack consists of two or more batteries. Note, the batteries must be removed from the meter and charged if the gates are not installed within four weeks of delivery;
- One set of primary ultrasonic water level sensors (long range);
- Standard Rubicon local flow and level software, including automatic local/remote flow control mode, local/remote gate position mode and local manual mode.

2. Project Budget

2.1 Funding Plan and Letters of Commitment

The Federal share of this project is $2,000,000.00 (49%) and the Non-Federal Share is $2,071,896.87 (51%) from the Paloma Irrigation and Drainage District (PIDD). The PIDD is the lead partner and will serve as the contact point for coordination with Reclamation, Contractors, and Engineer. PIDD labor resources will be utilized for the specific tasks during the approximate 2.5-year project duration. For In-Kind, PIDD will utilize internal staff and vehicles and equipment. PIDD will be responsible for project management, site evaluation, permitting work, survey work, pre-construction work, partial construction work, construction management and inspection, responses to construction request for additional information, and commissioning work. It is PIDD's goal to do as much as in-kind internal staff and resources as possible on this project. PIDD will prepare bi-annual financial reporting and project status reporting as well as the final report. By using PIDD staff and equipment, cost will be reduced due to efficiencies. In lieu of a commitment letter, the PIDD has provided the Official Resolution to show PIDD's commitment for the project and cost share commitment with the District's Board Members full approval.

The construction and installation will be done by a pre-certified qualified and selected Contractor through PIDD construction bidding process. The Engineering will be done by George Cairo Engineering, Inc. (GCE) and GCE will also provide support during construction.

Costs incurred before start date: $0.00

2.2 Budget Proposal

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal funding	$2,000,000.00
Costs to be paid by the Applicant	$2,071,896.87
Value of third-party contributions	$0.00
TOTAL PROJECT COSTS	**$4,071,896.87**

Project Costs Breakdown:
Federal Funding

BUDGET ITEM DESCRIPTION	AMOUNT
Materials	$1,187,000.00
Construction	$813,000.00
TOTAL FEDERAL FUNDING	**$2,000,000.00**

Non-Federal Funding – In Kind and Cash

BUDGET ITEM DESCRIPTION	AMOUNT
Salaries and Wages: *In Kind*	$192,991.04
Fringe: *In Kind*	$47,644.48
Travel: *In Kind or Cash if rented*	$6,302.80
Equipment: *In Kind or Cash* if rented	$245,226.30
Contractual/Construction: Contractor (Partial)	$1,179,973.50
Other: Environmental Compliance & Engineering	$399,758.75
In Direct Costs – De Minimis In-Kind	$0.00
TOTAL NON-FEDERAL FUNDING	**$2,071,896.87**

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity TYPE	TOTAL COST
	$/Unit	Quantity		
SALARIES/WAGES				
Project Manager	$66.35	480	HR	$31,848.00
Water Master/Foreman	$38.74	896	HR	$34,711.04
Project Assistant	$19.00	1200	HR	$22,800.00
Accountant	$65.00	720	HR	$46,800.00
Equipment Operator	$20.00	720	HR	$14,400.00
Gate Fabricator	$28.20	480	HR	$13,536.00
Laborer	$16.00	960	HR	$15,360.00
Concrete Fabricator	$28.20	480	HR	$13,536.00
			Subtotal	$192,991.04
FRINGE BENEFITS				
Project Manager	$12.46	480	HR	$5,980.80
Water Master/Foreman	$6.53	896	HR	$5,850.88
Project Assistant	$7.24	1200	HR	$8,688.00
Accountant	$0.00	720	HR	$0.00
Equipment Operator	$7.62	720	HR	$5,486.40
Gate Fabricator	$5.08	480	HR	$2,438.40
Laborer	$16.00	960	HR	$15,360.00
Concrete Fabricator	$8.00	480	HR	$3,840.00
			Subtotal	$47,644.48
EQUIPMENT (District Owned)				
Front End Loader John Deere 624K	$120.15	480	HR	$57,673.44
Rubber Tired Excavator Gradall XL5100	$143.19	180	HR	$25,773.66
24T Crane	$119.10	120	HR	$14,292.00
Water Truck	$160.19	600	HR	$96,115.80
Service Truck 1 Ton 2000 Ford	$48.94	600	HR	$29,363.40
Cat 410 Backhoe	$45.85	480	HR	$22,008.00
			Subtotal	$245,226.30

SUPPLIES AND MATERIALS				
Check Structure Rubicon Gates	$531,660.00	1	LS	$531,660.00
Turnout Rubicon Gates	$461,090.00	1	LS	$461,090.00
Community System	$84,000.00	1	LS	$84,000.00
Network Control & Software	$110,250.00	1	LS	$110,250.00
			Subtotal	$1,187,000.00
TRAVEL				
Meetings with 1/2T Pickup Trucks	$0.70	5916	HR	$4,141.20
Site Evaluation with 1/2T Pickup Trucks	$0.70	208	HR	$145.60
Construction with 3/4T Pickup Trucks	$0.70	2880	HR	$2,016.00
			Subtotal	$6,302.80
CONTRACTUAL/CONSTRUCTION				
Site Civil & Gate Installation Contractor	$1,816,070.00	1	LS	$1,816,070.00
Construction Inspection	$151,903.50	1	LS	$151,903.50
Construction Support & Commissioning	$25,000.00	1	LS	$25,000.00
			Subtotal	$1,992,973.50
OTHER				
Reclamation environmental and cultural compliance costs	$20,000.00	1	LS	$20,000.00
Engineering Design and Consultant	$379,758.75	1	LS	$379,758.75
			Subtotal	$399,758.75
TOTAL DIRECT COSTS				**$4,071,896.87**
INDIRECT COSTS				
De minimis	0%		base	$0.00
TOTAL ESTIMATED PROJECT COSTS				**$4,071,896.87**

2.3 Budget Narrative

Salaries and Wages (inclusive of Fringe Benefits)

PIDD	FY 2023	FY 2024	FY 2025	Estimated Sub-Total
General Manager/ Project Manager: Overall project management, coordination with Engineers, Manufacturer, and Contractor Installation of Rubicon Gate/Associated Controls/Structures, Scheduling of Staff and Equipment, etc.	16 hr/month for 6 months	16 hr/month for 12 months	16 hr/month for 12 months	480 hrs
Water Master/Foreman: Assist Project Manager – supervise PIDD field staff, etc.	32 hr/month for 4 months	32 hr/month for 6 months	32 hr/month for 6 months	896 hrs

Project Assistant: Assist Project Manager with project coordination & reporting	40 hr/month for 6 months	40 hr/month for 12 months	40 hr/month for 12 months	1200 hrs
Accountant: helped management project financials	32 hr/month for 6 months	32 hr/month for 12 months	32 hr/month for 12 months	720 hrs
Equipment Operator: Site initiation work, manage and handle all equipment during construction activities, etc.	120 hr/month for 2 months	120 hr/month for 2 months	120 hr/month for 2 months	720 hrs
Gate Fabricator: Site initiation work, construction activities, etc.	80 hr/month for 2 months	80 hr/month for 2 months	80 hr/month for 2 months	480 hrs
Laborer: Site initiation work, construction activities, etc.	160 hr/month for 2 months	160 hr/month for 2 months	160 hr/month for 2 months	960 hrs
Concrete Fabricator: Site initiation work, construction activities, etc.	80 hr/month for 2 months	80 hr/month for 2 months	80 hr/month for 2 months	480 hrs

PIDD certifies that the labor rates included in the budget proposal represent the actual labor rates of the identified personnel. The certification can be provided upon award of project.

Travel

IRS 2022 mileage is $0.585/mile. Due to the recent price increase in fuel and car value, the following assumption includes a 15% increase = $0.70/mile estimated for FY 2023, 2024, and 2025.

Item	**FY 2023**	**FY 2024**	**FY 2025**	**Estimated Sub-Total**
Meetings: Travel to Engineers, Contractors, and Consultants Offices	174 mi round trip, 1 meeting/month, 5 month, 2 vehicles	174 mi round trip, 1 meeting/month, 6 month, 2 vehicles	174 mi round trip, 1 meeting/month, 6 month, 2 vehicles	5916 miles
Site Visits: Travel to project sites for pre-construction work	8 mi round trip, 1 visit/month, 5 months, 2 vehicles	8 mi round trip, 1 visit/month, 4 months, 2 vehicles	8 mi round trip, 1 visit/month, 4 months, 2 vehicles	208 miles
Construction: Travel to construction sites during construction activities	8 mi round trip, 20 visit/month, 2 months, 3 vehicles	8 mi round trip, 20 visit/month, 2 months, 3 vehicles	8 mi round trip, 20 visit/month, 2 months, 3 vehicles	2880 miles

Equipment: Will use USACDOE equipment (EP 1110-1-8 30 November 2018)
Rate = (Average Hourly Rate + Fuel) * 10% → Multiple by 10% since USACE rates are from 2018

Front End Loader – Site preparation and final cleanup, installation (L40CA024)
Rubber Tired Excavator – Site preparation and final cleanup, installation (H30GA011)
Water Truck – Dust Control (T50XX029 and T40OX002)
Service Truck – Used in support of PIDD Crew on-site (T50XX010)
24T Crane – structures and gates transportation and installation (C80XX002)
Cat 410 Backhoe – Material transportation and grading (L50CA002)

Materials and Supplies

<u>**List of Materials:**</u>
Appurtenances and structures for new Rubicon Gates:
Concrete, sections near gate reinforced with mesh and/or rebar
Rebar
Gravel
Forms/Traverses
Pipe - galvanized for footings
Pipe or for Railings or Platforms
Rubicon SlipMeter Gates
Rubicon Pikometer Gates
Rubicon FlumeGates
Selected soil materials

Safety Supplies:
Shade
Water
Gloves
Reflective Vests
Steel-Toed Boots
Cones
Coolers
Electrolytes
Safety Glasses
Hard Hats
Signage
Barricades

Automation, Measurement Devices and Controls:
The following is a description of the 10 Rubicon Flume Gates and SlipMeter Gates:
The Rubicon FlumeGate includes the following items:

- The FlumeGate® constructed out of marine grade aluminum is a precision overshot leaf flow measurement and flow control gate that measures fully submerged flows (90 percent) and mounts directly into a flow control structure gate bay.
- Each gate comes as a complete turnkey installation, equipped with a control pedestal which includes a standard processor and keypad for automation, solar panel power system and a 16 ft mast for mounting of a communication antenna.

- One aluminum external mounting frame, c/w stainless steel anchors, Hilti epoxy and SIKA sealant.
- One 12-volt DC deep cycling battery pack. Each pack consists of two or more batteries. Note, the batteries must be removed from the meter and charged if the gates are not installed within four weeks of delivery.
- One set of primary ultrasonic water level sensors (long range).
- Standard Rubicon local flow and level software, including automatic local/remote flow control mode, local/remote gate position mode and local manual mode.

The SlipMeter includes the following items:

- The SlipMeter is a precision flow control and flow measurement gate that measures fully submerged flows (and partial-full flow in partial-full models) and mounts directly to a turnout headwall with no straight pipe requirements.
- The SlipMeter comes equipped with an internal and external frame c/w stainless steel anchors, epoxy capsules and polyurethane sealant.
- Each SlipMeter comes equipped with a separate standalone control pedestal which includes a display and keypad, solar panel power system and a 16 ft mast for mounting of communication antenna; RTUs, radio and antenna by others.
- The SlipMeter comes complete with an integrated power supply comprising an 85W solar panel, a solar regulator, and a 48Ah 12-volt deep cycling battery pack. Note, the batteries must be removed from the meter and charged if the gates are not installed within four weeks of delivery.
- Standard Rubicon local controller software, including automatic local/remote flow control mode, local/remote gate position mode and local manual mode.

The Flumegate includes the following items:

- One aluminum FlumeGate. Each gate comes as a complete turnkey installation, equipped with a control pedestal which includes a standard processor and keypad for automation, solar panel power system and a 16 ft mast for mounting of a communication antenna.
- One aluminum external mounting frame, c/w stainless steel anchors, Hilti epoxy and SIKA sealant.
- One 12-volt DC deep cycling battery pack. Each pack consists of two or more batteries. Notes, the batteries must be removed from the meter and charged if the gates are not installed within four weeks of delivery.
- One set of primary ultrasonic water level sensors (long range).
- Standard Rubicon local flow software.
- Customized Rubicon Distant Downstream Level control software.

The PikoMeter includes the following items:

- The PikoMeter is a combination precision flow meter and automated control gate that measures fully submerged flows and mounts directly to a headwall with no straight pipe requirements, and arrives as a complete turnkey installation.

- Each PikoMeter comes equipped with a separate standalone control pedestal which includes a display and keypad, solar panel power system and a 16 ft mast for mounting of communication antenna.
- The PikoMeter comes complete with an integrated power supply comprising an 85W solar panel, a solar regulator, a 48Ah 12 volt deep cycling battery pack. Note, the batteries must be removed from the meter and charged if the gates are not installed within four weeks of delivery.
- The PikoMeter comes equipped with an internal and external frame c/w stainless steel anchors, Hilti capsules and SIKA sealant.
- Standard Rubicon local controller software, including automatic flow and gate position modes.

The following is a list and description of the new automated measurement devices/controls and Rubicon gates.

No.	Gate ID	Remove Existing	New Installation
1	GD 0.1	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
2	GD2	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
3	GD3	Fabricated Slide Gate Turnout 31.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
4	GD4	Fabricated Slide Gate Turnout 31.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
5	**HGD2**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
6	GD5	Canal Gate Turnout 24" Diameter	Rubicon 18" Pikometer Model PM-450-1400 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
7	GD6	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
8	GD7	Canal Gate Turnout 24" Diameter	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
9	GD8	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances

10	GD9	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
11	GD10	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
12	GD11	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
13	GD12	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
14	**HGD3**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
15	GD13	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
16	GD14	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
17	GD15	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
18	**HGD4**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate2x Model FGB-1050-1587 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
19	GD16	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
20	**HGD5**	Jack Lift Check Structure 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
21	GD17	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
22	GD18	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
23	**HGD6**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
24	GD19	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and

			downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
25	GD20	Fabricated Slide Gate Turnout 32.5" Width Opening	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
26	**HGD7**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
27	GD21	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
28	**HGD8**	Jack Lift Check Structure 3 Bays 42" Width Opening	Rubicon 38.5" Flume Gate 2x Model FGB-1050-1587 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
29	GD22	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
30	GD23	Fabricated Slide Gate Turnout	Rubicon 24" Slip Meter Gate Model SMB-600-1500-C Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances
31	**HGD9**	Jack Lift Check Structure 2 Bays 42" Width Opening	Rubicon 38.5" Fume Gate 2x Model FGB-0626-1077 Fully Integrated Solution: Includes data processor, communication antenna, upstream and downstream water level sensors, automatic local and remote flow control, solar power system and appurtenances

Contractual/Construction

Other than engineering, all construction work will go through the District procurement process. Paloma Irrigation and Drainage District (PIDD/District) is not required though aims to follow the Arizona Statues Title 42 Special Taxing Districts, Chapter 19 Irrigation and Water Conservation Districts, Article 3 Administration, 48-2985 and 48-2986 that requires the preparation of plans, public advertisement, receiving bids, and awarding a contract. PIDD practice is to advertise the project, depending on the size and scope of a project, the normal time from advertisement to receipt of bids is generally 2 to 4 weeks but may be extended on large multi-million-dollar projects. The District may hold a pre-bid meeting, project site tour, and allow for questions from prospective bidders. Once bids are received, the District will evaluate and check the bid responses against the bid requirements and select the lowest qualified bidder. The District will issue a Notice of Award and then proceed with the project contract execution and issue a Notice to Proceed.

<u>Contractor:</u>

The following will be Structure and Gate Installation Contractor's work with the assistance of PIDD Staff. Cost was estimated based on recent pricing.

For turnout gate upgrade:

- Either dewater or lower water level in Lateral D
- Install earthen berm if needed
- Install small pump to remove any nuisance water
- Remove existing gate from turnout and check structures
- Prep concrete surface for gate installation including any concrete repairs or construct cast-in-place structures to hold the new Rubicon gates
- Install new gates with Rubicon On-Site Support
- Bolt new gates to the existing structure and adjust for proper sealing
- Test and commission gates
- Remove earthen berm form the Lateral D Canal
- Return to normal operating conditions in the Lateral D while completing the remainder of the electrical and site work
- Rubicon will install all SCADA related and Total Control Channel electric work and live connect system work.

Third-Party In-Kind Contribution
$0.00

Other Expenses
Engineering
Cost was estimated based on recent pricing.

- Project management activities including periodic project coordination meetings with PIDD and Contractors, inclusive of a project kick-off meeting
- Data collection and final field design and hydraulic survey work
- Permitting coordination and support activities if needed
- Finalize design plans and structural sheets for each of the 23 turnouts and 8 check structures
- Services during construction assistant on an as-needed basis for bid procurement, RFIs and addendum responses
- Post design, services during construction activities, and installation and commissioning supervision
- USBR Environmental Compliance and support services

Environmental and Regulatory Compliance Costs
$25,000 for NEPA work. PIDD has conducted Class III Cultural Resources Survey and Historic Documentation for the Paloma Irrigation and Drainage District Report and as part of this project, may need to update it to include Lateral D. It is expected that a Categorical Exclusion will be required for this project.

Indirect Costs
0% de minimis of overall sub-total.

3. Environmental and Cultural Resources Compliance

- **Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.**

The project will have NO significant impact on the surrounding environment. All earth disturbing work will occur within existing canal and sidewalls and existing easement.

- **Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?**

No Endangered species will be affected by this project.

- **Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.**

No, there are no wetlands within the project boundary.

- **When was the water delivery system constructed?**

The Paloma Irrigation and Drainage District canal system, built in 1919, was the largest privately funded irrigation project in Arizona history.

- **Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.**

Yes, this project will result in the replacement of old, eroded gates, with new automated gates that use Sonaray Total Channel Control technology to measure and maintain water levels. In comparison to the current standing of these gates, the Flumegates allow for canal operator safety, service and equity to users and corrosion protective materials to ensure water is not further being contaminated.

- **Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.**

There are no listings on the National Register of Historic Places in the project area. The nearest locations are approximately 5-20 miles away: Painted Rock, Stouts Hotel, Gila Bend Overpass, MacLennan House, and Gillespie Highway Bridge.

- **Are there any known archeological sites in the proposed project area?**

There are no archaeological sites in the project area, but the following sites are approximately 5-20 miles away: Painted Rock and Rocky Point Maricopa.

- **Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?**

There are no disproportionally high or adverse effects on low income or minority populations. This project will positively affect these populations.

- **Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?**

This project will cause no limited access to or ceremonial use of sacred sites or impact Tribal lands.

- **Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?**

No, this project will have the opposite effect, reducing noxious weeds and nonnative invasive species, including aquatic vegetation.

4. Required Permits or Approvals

There are no permits or approval required for this project beyond of Reclamation's requirements.

5. Overlap or Duplication of Efforts Statements

Paloma Irrigation and Drainage District does not have any projects which overlap between the proposed project nor any other active or anticipated proposal or projects in terms of activities, costs, or commitment of key personnel. The submitted proposal from PIDD is not in any way duplicative of any proposal or project that has been or will be submitted for funding consideration to any other potential funding source.

6. Conflict of Interest Disclosure

Paloma Irrigation and Drainage District does not have any existing conflicts of interest, nor do we anticipate having any conflict of interest during the Federal award period.

7. Certification Regarding Lobbying

Paloma Irrigation and Drainage District certifies no current lobbying activities. Please see the completed SF-LLL Form.

8. Uniform Audit Reporting Statement

To date, the Paloma Irrigation and Drainage District has not received $750,000 in U.S. dollars or more in Federal grant award funds during a single fiscal year.

9. Letters of Project Support

Please see attachment for Letters of Support on this project. Letters of support from:

- Various Water Users and Farmers

10. Official Resolution

Attached in the Appendix Section is an authorization and resolution approved by the Paloma Irrigation and Drainage District, no third-party financial support.

11. Unique Entity Identifier and System for Award Management

The Paloma Irrigation and Drainage District is registered on SAM.gov and has an UEI number. Please see the completed SF-424 Form.

12. Appendices

Appendix A: Letters of Project Support
Appendix B: Official Resolution
Appendix C: PIDD Background
Appendix D: Photos and Maps of Project Area
Appendix E: Estimated Quotes