FUNDING OPPORTUNITY
BOR-DO-20-F001
FOR
WATERSMART GRANTS:

WATER AND ENERGY EFFICIENCY GRANT APPLICATION
FOR

CONSTRUCTION OF FIVE GATES
CONVEYANCE IMPROVEMENTS
FY 2019

Submitted To:

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1. Technical Proposal and Evaluation Criteria

1.1 Executive Summary

This application is being submitted by:

Bard Water District (BWD)
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The Bard Water District has selected a project under USBR WaterSMART: Water and Energy Efficiency Grant (WEEG) Program. This project is entitled, ***Construction of Five Gate Conveyance Improvements to Increase Efficiency and Effectiveness of Water Distribution***. The Bard Water District is submitting this WEEG application for constructing conveyance improvements (gates, turnouts, headwalls, and wingwalls) for the Five Gate Structures (Bard Unit, Area F). This project is listed as a Priority 1 in the USBR Reservation System Evaluation Project conducted in January 2017: Technical Memorandum No. USBR 35-RDE-8150-STY-2016-02 (See Appendix B for referenced documents). After careful review by BWD in consultation with our Board and the Yuma USBR field office, BWD proposes to complete all the work on the Five Gates for better water management and conservation by increasing efficiency (optimal flow rates), reliability (reduce leakage, operational losses and risks over overtopping/flooding and improvement to our overall system at this major water distribution juncture.

We have already begun to accomplish the goals established for the WEEG Program by already receiving a grant for the Engineering/Design phase and now applying for a grant to implement actions that will increase water supply reliability through our investments in replacing the damaged, barely operational, aging Five-Gates (infrastructure), conserving water and increasing efficiency of our system. **Specifically, by eliminating this choke point; we will be able to control elevations, prevent upstream flooding/erosion, prevent leakage and operational losses, thus providing consistent flow/delivery downstream and preventing overtopping of the overshoot gate structure and the dirt banks upstream to prevent catastrophic crop damage from unscheduled flooding.** We will work together with our stakeholders (Water users – Bard Unit and Indian Unit - Quechan Indian Tribe – Fort Yuma Indian Reservation) and USBR to share costs by leveraging funding and resources. We are also working with NRCS/Farmers to complement this process. We would conserve 4,259 Acre-Ft/Yr or 30% of the water delivered to this area.

Tentative Schedule:

Due to funding limitations, this project will be completed two phases, with the **Engineering/Design Phase** first to be funded. ***We were awarded a Water Conservation Field Services Program Lower Colorado Region Design and Engineering Grant for the Five Gate project in 2018.*** We have begun working with our contractor and will be having our second design meeting October 3, 2019 and anticipate completion by the end of December. We plan to complete the Five Gate Project in 8 months April 1st through November 30, 2020 (Construction Phase – 3 months).

This project is located on a Federal facility.

1. Technical Proposal and Evaluation Criteria (Continued)

1.2 Background Data

The Yuma Project, initiated in 1909, is a Federal Reclamation Project and lies within the historical boundaries of the Fort Yuma Indian Reservation in Southeastern California (Imperial County) along the lower Colorado River near Yuma, Arizona. The Bard Water District and Lands located in the Yuma Project includes the Valley Division in Arizona and the Reservation Division in California. The Reservation Division consists of approximately 14,700 irrigable acres of which 7,100 acres are in the Bard Unit (Bard Water District, mostly on the Eastern portion) and 7,600 acres in the Indian Unit (mostly on the Western portion). This proposed Five Gate project (Reservation Main Canal) was originally constructed as part of the 1909 Yuma Project.

On December 1, 1978, the Bard Irrigation District was renamed the Bard Water District. In March 1981, the Bard Water District entered into a contract with the U.S. Bureau of Reclamation (USBR) for the operation and maintenance of the Bard Unit, In January 1983, BWD entered into an additional contract to operate and maintain the Indian Unit facilities. The Indian Unit Water Users pay the Bureau of Indian Affairs (BIA) their O & M costs, then these funds pass through to the USBR and eventually BWD is compensated. *The overall condition of the delivery and drainage systems is relatively poor due to aging infrastructure , flood damage, maintenance challenges and other causes,* USBR TM 86-68210-2016-07, Evaluation of O & M Costs Allocation, July 2016.

The Fort Yuma Indian Reservation of California was established for the Quechan Indian Tribe by an Executive Order of January 9, 1884. These Indian lands are held in trust by the BIA for the individual Indian allottees in about 10-acre allotments. This acreage is pooled and leased to approximately 10 major farm operators in the area. The leases are administered by the Bureau of Indian Affairs. The Bard Unit contains patented lands held in private ownership. There are about 190 individual water user accounts in the Bard Water District and 10 in the Indian Unit.

Work began on the distribution system of the Reservation Division in 1909 and the patented land was opened to settlers in 1910. With the construction of the Laguna Dam from 1905-1909, approximately 38,000-acre feet per year were provided to the non-Indian sections. The Bard Irrigation District was organized in 1927 to represent landowners in the Bard District. Water for the project was diverted from the Laguna Dam.

Later after the construction of the Imperial Diversion Dam (1938), 5 miles upriver and the completion of the All-American Canal (1941), irrigation for the Reservation Division was diverted from 5 turnouts along the All-American Canal. This included the Siphon Drop Power Plant for additional turnouts off the Yuma Main Canal for the Valley Division located in Arizona.

1. Technical Proposal and Evaluation Criteria (Continued)

1.2 Background Data (continued):

The Bard water users originally contracted (beginning in 1909) with the Bureau of Reclamation under Present Perfected Rights to provide water under this pre-existing agreement. Bard's consumption is based upon these farm units. The Yuma Project Reservation District (YRPD) are able to divert all the water needed for crops; not to exceed 25,000 acres per year. The Bard Water District is just below the Laguna Dam, the first dam built on the Colorado River to divert water for the Yuma Project. The Bard Unit is part of the Yuma Project Reservation Division and has 2nd Priority Water under the California Seven Party Agreement. Return water flows back into the Colorado River and continues to Mexico as specified by the International Agreement. The most important crops grown in the Bard Water District are produce, Medjool dates, citrus, cotton, alfalfa hay, and wheat. Crops can be grown year-round in this warm dry climate with little need for frost protection.

Currently, the Bard Water District operates and maintains 67 miles (353,760 Linear Feet) of irrigation ditches and canals; only 30% are lined with concrete or concrete piping. YPRD diverts approximately 90,000 acre feet per year to irrigate approximately 15,000 acres. Efforts to conserve water are challenging in Bard's antiquated system, but Bard works closely with its Water Users, USBR and other agencies to be pro-active in addressing these issues.

1. Technical Proposal and Evaluation Criteria (Continued)

1.2 Background Data (continued):

Source of Water Supply: Colorado River **Water Rights Involved:** 2nd Priority

Total Quantity of Water Supplied: Bard Unit: 50,000 acre ft/yr Indian Unit: 49,000 acre ft/yr

Current Users and Number Served: Agricultural 150

Major Crops: Wheat, Sudan Grass, Produce and Cotton (Listed by water demand: High ➡ Low)

Total Acres Served: Bard Unit 7,100 Indian Unit 7,600

Estimated Water Loss Reduction if Conveyance modernized:
Approximately 4,259 acre feet/year or 30% of water delivered to this area.

Potential Shortfalls in Water Supply: If drought continues, quantities could be reduced. Increased demand from new users. Water conservation measures are critical. Farmers here have already been encouraged to implement seasonal fallowing, use drip irrigation methods, sprinkler systems to germinate seeds, eliminate crops that require large quantities of water (i.e. wheat or Sudan grass – Estimated total of 16-acre feet (48 hours @ 4-6 intervals).

Bard Water District Water Delivery or Distribution System: Agricultural Use only.

Type and Approximate Total Lengths of Canals, Laterals and Pipes: 67 Miles 353,760 LF
Concrete Lined/Pipe: 25 Miles 132,000 LF (37%) **Unlined:** 42 Miles or 221,760 LF (63%)

Type and Approximate Total Lengths of Canals: 13 Miles 36,640 LF
Concrete Lined: 7 Miles 36,960 LF **Unlined:** 6 Miles 31,680 LF

Type and Approximate Total Lengths of Laterals: 50 Miles 264,000 LF
Concrete Lined: 12 Miles 63,360 LF **Unlined:** 36 Miles 190,080 LF

Fragmented/Deteriorated Concrete Lined Lateral: 1 Mile 5,280 LF

Type and Approximate Total Lengths of Pipes: 3 Miles 15,840 LF

Number of Irrigation Turnouts: 450

Significant Irrigation Improvements: Remote Monitoring Devices: 5 and 2 (2020)

NRCS Projects: 2 (2019) and 22 (proposed)

1. Technical Proposal and Evaluation Criteria (Continued)

1.2 Background Data (continued):

The Bard Water District Activities/Funding:

1) BWD maintains a continuous working relationship with the Bureau of Reclamation's office in Yuma (collaborating to update our Water Conservation Plan for 2020 as well as assisting with our new grants), USBR's Technical Service Center, the as well as with the USDA, NCRS and the University of AZ, Yuma campus.

2) BWD works diligently to maintain and repair our aging systems with very little funding and resources. In 2004, we received a North American Development Bank grant with 25% Tribal and 25% Bard Water District matching funds. 12 Miles of canals and ditches were lined with concrete or concrete piping and check structures were installed. Bard water users obtained this loan and pay $18.50 per acre per year until 2023 to cover the costs of this construction. All water saved may be used by a lower priority.

3) Also, in 2004, BWD received $225,000 from the USBR Water Conservation Program for Measuring Devices.

4) In 2016, BWD initiated a two-year pilot seasonal land fallowing project in 2016 (MWD) which we expanded threefold (approximately 500 acres initially to 1,500 acres in 2017 and 2018 with BOR, CAWCD, MWD, DW, and SNWA).

5) In 2018, Bard Water Users partnered with the NCRS for several new Canal Lining Projects.

6) In 2018, our water users pledged $25/acre for Capital Improvements. They also provide a percent of their fallowing funds for system efficiency improvements. They are very supportive of any funding we receive to help correct system deficiencies as well as improving efficiency.

7) In 2018, BWD was awarded four USBR grants:
WATERSMART Small-Scale Water Efficiency Grant to install a new Drop Leaf gate to stop the unrestricted water flow into a 1-mile section of the Cocopah Canal past the Ute Lateral ($33K) *Unfortunately after a year of waiting for the NTP and additional costs we have declined the award and will reapply in October or November 2019;*

Water Conservation Field Services Program for Lower Colorado River: Demonstrating Conservation project Technologies for Measurement Devices and Flume Construction on the Reservation Main and Cocopah Canals ($80K);

Water Conservation Field Services Program for Lower Colorado River: Design and Engineering for the Five Gate Structure ($83K). A Priority 1 for these aging and barely operation structures.

Third Funding for Two Year Voluntary Pilot System Water Conservation Program, total of around 2,400 acres ($295K).

1. Technical Proposal and Evaluation Criteria (Continued)

1.2 Background Data (continued):

The Bard Water District Activities/Funding:

8) New Grants applied for in 2019:
Two Small-Scale Water Efficiency Program (SWEP) grants submitted April 2019 (Denver office) for Engineering/Design and Construction/Lining (First 4,250 LF of Acoma Lateral).

Water Conservation Field Services Program Lower Colorado Region *for Engineering/Design for Acoma Lateral Lining and Appurtenances (Second 4,250 LF plus 1,300 LF of Acoma Lateral).*

Water Conservation Field Services Program Lower Colorado Region *for Engineering/Design for Mohave Canal Lining and Appurtenances (Phased for 1/5 of 2.7 miles).*

WaterSMART Drought Resiliency grant - Meeting with staff/board to identify project

WaterSMART Water and Energy Efficiency grant for Construction of Five Gate October 2019 ***This funding request***

Cooperative Water Management Program Phase 1 – Watershed Planning November 2019

Two Small-Scale Water Efficiency Program (SWEP) grants – RC Gate Replacement and Cocopah Drop Leaf Gate Replacement (Engineering/Design and Construction) Winter 2019/2020

USDA RCPP Grant – Matching Funds for Five Gate December 2019

USDA EQIP Grants – Working with local farmers Fall 2019-Spring 2020

IRWM – State of CA – Matching Funds for USBR Grants and New Projects TBD.

9) BWD has developed a great partnership with our water users for Irrigation methods that promote water use reduction (sprinklers, drip, etc.) and Crops that require less water. They actively participate our water conservation methods because not only is good for our water resources it provides them a cost savings.

1.2 Project Location:

Quechan Indian Reservation, Bard and Winterhaven CA

Located West of Colorado River

East of Arizona Border (1 mile) and North of Mexican Border (2 miles)

Latitude N 32° 48.486' (32° 48'29.3")

Longitude W 114° 31.686' (114° 31'41.1")

1. Technical Proposal and Evaluation Criteria (Continued)

1.2 Project Location (continued)

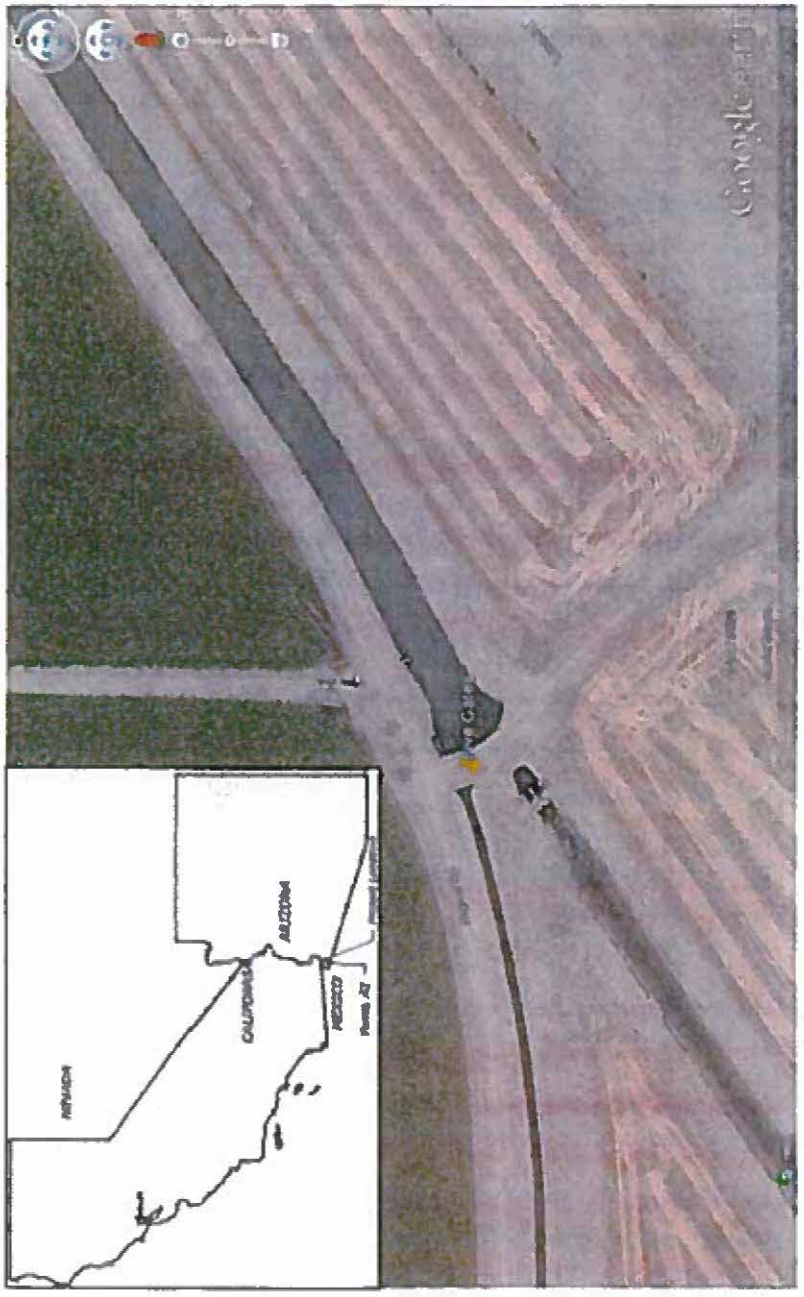


Figure 1: Five Gate Location

1. Technical Proposal and Evaluation Criteria (Continued)

1.3 Technical Project Description

Purpose and Objectives of Proposed Project

The purpose and objectives of the project is to replace the antiquated Five Gates structure (USBR and BWD Priority 1) that is a major chokepoint. **Specifically, by replacing each of the Five Gates and their appurtenances with new structures to control elevations, prevent upstream flooding/ erosion, thus providing consistent flow/delivery downstream and preventing overtopping of the overshoot gate structure and the dirt banks upstream to prevent catastrophic crop damage from unscheduled flooding.**

The Five Gates are a series of gated culverts in Area F, where the Mohave Canal turnout begins off the Reservation Main Canal. It is the structure of the bifurcation of the of the Mohave Lateral diversion and the Reservation Main Canal. *Structurally it is seriously deteriorated. The concrete is deteriorating, and some gates are non-operational. The structure is not functioning how it was designed to; only a few of the gates are operating , making a choking point for flows.* This project is listed as a Priority 1 in the USBR Reservation System Evaluation Project conducted in January 2017: *Technical Memorandum No USBR 35-RDE-8150-STY-2016-02.* This project is for the second phase. The Engineering/Design Scope of Work/Quote is provided in Appendix A. Other documents from the USBR are provided in Appendix B for your review.

The project will include the following tasks:
Bypass for use during construction: Shotcrete Channel
Demolition: Concrete Structures
Earthwork: Grading, Fill/Compacting
Fabrication: Gates
Construction:
Gate Installation
Lining and Appurtenances
Pipeline Design Concrete (Plastic Alternate)
New Turnout (Private Delivery)
Tie-Ends

Please note we are meeting with our Engineering/Design Contractor on October 3, 2019 and will be able to provide more detail after his work is complete.

We also have the following technical reports provided by USBR, NCRS and BWD for this project (Appendix A):
Five Gates Structure Replacement Foundation Recommendations – USBR TSC May 2018
Five Gates Structures Elevations – USBR Yuma Office – 2018
Five Gate Diversion Structure Replacement – USBR TSC Value Engineering Report
Conservation Implementation Strategy for Bard, CA Imperial County, Irrigation Improvement Project, Steve Reddy – District Conservationist, NRCS Yuma, AZ
Water Conservation Plan – BWD
Ten-Year Capital Improvement Plan - BWD

1. Technical Proposal and Evaluation Criteria (Continued)

1.2 Technical Project Description

This project complies with our approved Five-Year Water Conservation Plan and has been a priority 1 to us and the Quechan Indian Tribe for the last 16 years. The estimated total project costs total over one million dollars (Technical Service Center has estimated 1.2 to 1.7 million). Due to funding limitations, we plan to complete this project two phases, we already received funding for the Engineering/Design portion, so **this funding request is limited to the on-the-ground construction phases identified on the previous page.** The **Engineering/Design Phase** will be already completed (May – December 2019) so we will be more than ready to start the project if awarded. We also have a very small interval to complete the project in order to minimize any adverse effects on our farmers (summer – June through August).

We have already begun to accomplish the goals established for the WEEG program with the engineering and design grant awarded by USBR in 2018 to be completed in December 2019 and later Phase 2 for this funding request for implementing actions that will increase water supply reliability through our replacing the damaged, barely operational, aging Five-Gates (infrastructure), conserving water and increasing efficiency of our system. We will work together with our stakeholders (Water users – Bard Unit and Indian Unit - Quechan Indian Tribe – Fort Yuma Indian Reservation) and USBR to share costs by leveraging funding and resources.

The expected outcomes of the project are as follows:

1) Better Water Management for water delivery and distribution from the Reservation Main Canal.
2) increase water supply reliability by replacing the damaged, barely operational, aging Five-Gates (infrastructure), conserving water (significantly reducing water loss) and increasing efficiency of our system.
3) Improvement to our overall system and infrastructure, specifically, by installing new structures to control elevations, prevent upstream flooding/erosion, thus providing consistent flow/delivery downstream and preventing overtopping of the overshoot gate structures.
4) **Prevent catastrophic crop damage** from unscheduled flooding by designing operational gates that enable us to maintain consistent flow and elevation to prevent over topping of the dirt bank upstream.
5) We will work together with our stakeholders (Water users – Bard Unit and Indian Unit - Quechan Indian Tribe – Fort Yuma Indian Reservation) and USBR to share costs by leveraging funding and resources.
6) Accomplish WaterSMART goal of preventing possible water-related crisis (shortfalls or flooding).

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria

A. QUANTIFIABLE WATER SAVINGS

The Five Gates are a chokepoint at the beginning our major water distribution system. The Five Gates are a series of gated culverts in Area F, where the Mohave Canal turnout begins off the Reservation Main Canal. It is the structure of the bifurcation of the of the Mohave Lateral diversion and the Reservation Main Canal. *Structurally it is seriously deteriorated. The concrete is deteriorating, and some gates are non-operational. The structure is not functioning how it was designed to; only a few of the gates are operating, making a choking point for flows.* Specifically, by using our engineering/design plans for construction to control elevations, prevent upstream flooding/erosion, thus providing consistent flow/delivery downstream and preventing overtopping of the overshoot gate structure and the dirt banks upstream to prevent catastrophic crop damage from unscheduled flooding. This project is listed as a Priority 1 in the USBR Reservation System Evaluation Project conducted in January 2017: Technical Memorandum No USBR 35-RDE-8150-STY-2016-02. Documents from this report as well as a USBR Value Engineering Report are provided in Appendix B for your review.

Every time water is delivered through this main canal the inadequacy (chokepoint) of the system requires constant flow rate adjustments to prevent flooding/erosion/water loss upstream. Once we received the USBR TSC estimate for this project (1.2 to 1.7 million dollars) we developed a strategic plan to complete the project in the phases provided in the Technical memorandum, leveraging our funding/in-kind each year with other funding to complete this critical project. In February, the Quechan Indian Tribe applied for a USBR Drought grant for the total project but were unsuccessful. This reinforces our strategy to complete the work in phases, especially since we must provide a 50% match.

Estimated Water Savings:

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. We also just received a new grant to install a long-throated flume and two remote measurement devices on the Reservation Main Canal that will be installed this in June 2020.

Operational (100%):	1,319.0 Acre-Ft/Yr	
Transportation (100%):	133.3 Acre-Ft/Yr	
Transpiration (25%):	87.0 Acre-Ft/Yr	(Increased Flow Rate – Less Transpiration)[1]
Seepage (25%):	2,719.25 Acre-Ft/Yr	(Increased Flow Rate – Less Seepage)
Total	4,258.55 Acre-Ft/Yr	or 30% Savings

[1] NRCS/Yuma – Calculated

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

A. Quantifiable Water Savings (continued)

Current Losses for Reservation Main and Mohave:

All were calculated by USBR – Yuma Office using our data collected by our ditch-riders for our Five-Year Conservation Plan (unless otherwise noted).

Operational:	1,319.0	Acre-Ft/Yr	
Transportation:	133.3	Acre-Ft/Yr	
Transpiration:	348.0	Acre-Ft/Yr	(NRCS/Yuma – Calculated)
Seepage:	10,877.0	Acre-Ft/Yr	
Total	12,677.3	Acre-Ft/Yr	50% Loss

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).

B. Water Supply Reliability

BWD meets the terms of Section 9504(a)(3)(B) of Public Law 111-11 in that no additional acreage will receive irrigation water saved from this project. We currently abide by our quota and have strived to reduce it by encouraging our growers to implement seasonal fallowing, upgrading to water reduction irrigation delivery systems, and growing crops that require less water. All our saved water goes to "lower priority" users.

Will the Project Address a Specific Water Reliability Concerns?

Issues:

Our main concern is a catastrophic failure of one of our delivery systems causing unsurmountable crop damage. Most of our funds are used for O & M, repair and replacement of extremely old, deteriorated structures and additional staff time to just keep us operating without major incident. *The overall condition of the delivery and drainage systems is relatively poor due to aging infrastructure , flood damage, maintenance challenges and other causes,* USBR TM 86-68210-2016-07, Evaluation of O & M Costs Allocation, July 2016. We have approximately 67 miles of canals, laterals and ditches of which only 30% are lined. We have 465 gate check structures, the majority of which are over 35 years old (life of concrete is only 20 years) and need to be repaired or replaced. Our staff's efforts are well over 100% because of the additional time and effort required to manage our delivery systems to prevent crop damage. We are constantly trying to prevent component failures while slowly addressing our and USBR priority 1 projects.

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

B. WATER SUPPLY RELIABILITY (continued)

This project, however, will also enable us to concern approximately 30% of the water going through the delivery system. Allowing us to be pro-active in addressing drought, short-falls and other critical water issues.

This project will Improve overall reliability by addressing:
Significant water supply short-falls (future droughts, increased demand, seasonal demands).
Benefiting multiple sectors and multiple users:
BWD Farmers, Indian Unit (Quechan Indian Reservation - shared system), Water not diverted stays in system for other low priority water users.
Increase resiliency during drought: Our approved Five-Year Water Conservation Plan helps us to be pro-active and to develop and employ strategies for water use reduction through system efficiency (targeting and prioritizing construction projects).

Conserved Water:
Conserved water will go to lower priority users. The water we save will remain in the system under the stewardship of the BOR because it will not be diverted. They will be able to determine its best use.

Will the Project Make Water Available to Achieve Multiple Benefits or to Benefit Multiple Users? Yes, it will go to lower priority users who are more effected by water shortages. USBR can use this water to aid other growers, municipalities or other nearby entities. This will be especially important in times of shortages and drought.

Will the project benefit species (T & E)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project.
Will the project address water supply reliability in in other ways not described above?
Water left in the Lower Colorado River System could benefit the Yuma Clapper Rail and the Southwest Willow Flycatcher. These birds' nest and raise their young along the Lower Colorado River watershed in the spring. This watershed is the corridor for wildlife preserves as well as small lakes and recreational areas. We have a local conservation group Friends or Haugthlin Lake who are working to protect the watersheds in our area.

Larger Initiative?
State of CA Integrated Water Management Program – planning and program development. Demonstrate strategies and actions for small, disadvantaged rural communities.
USBR Colorado River Lower Basin Drought Contingency Plan – recently signed.
We will work to incorporate components the goals or these documents into our Ten-Year Capital Improvement Plan, Water Conservation Plan and funding strategies.

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

B. WATER SUPPLY RELIABILITY (continued)

Does the Project Promote and Encourage Collaboration Among Parties in a Way that Helps Increase the Reliability of the Water Supply?

Yes, this project demonstrates collaboration between our water district and our agricultural users. It can be used as an example to other water managers reflecting how assessment, planning, usage, need, and corrective measures can be achieved to benefit a district. Even though the costs for modernizing irrigation systems can be prohibitive, we demonstrate that we can slowly upgrade and replace our conveyance systems and appurtenances, a few at a time and line our canals and laterals in sections one mile at a time or every 20 years fund a major capital improvement project (2014 for 8 miles at $8 million through NAD Bank). Our water uses recently pledged $25/acre for O & M. They also provide a percent of their fallowing money. They are very supportive of any funding we receive to help improve our system. They actively participate our water conservation methods because not only is good for our water resources it provides them a cost savings, especially with labor costs increasing.

Will the project benefit Indian Tribes? Yes, indirectly since the both Irrigation Units (Bard and Indian) share the resources and funding.

Will the project benefit rural economically disadvantaged communities?

Yes, West Imperial County is a rural, low-income, disadvantaged community (Bard, Winterhaven, and Fort Yuma Indian Reservation).

Does the Project Promote and Encourage Collaboration Among Parties in a Way that Helps Increase the Reliability of the Water Supply? Our collaboration efforts are an ongoing process with our stakeholders (landowners, growers, our District Board the Quechan Indian Tribe). We also help facilitate interaction with the NRCS and just recently the state of CA IRWM program. The Quechan Tribe applied for this grant in February 2018 for the Five Gates but were unsuccessful. The Tribe as well as our growers have been pushing for this project. They want it done ASAP. They feel that with the grant already received for the Engineering and Design portion that the construction grant should easily follow. Even the USBR Yuma office and Technical Service Center and NRCS assisted to provide information, data and reports (See Appendix A for excerpts).

USBR Reservation System Evaluation Project conducted in January 2017: Technical Memorandum No. USBR 35-RDE-8150-STY-2016-02

Five Gates Structure Replacement Foundation Recommendations May 2018
BOR Technical Service Center Denver Colorado

Five Gates Structures Elevations – USBR Yuma Office – 2018

Five Gate Diversion Structure Replacement – Value Engineering Report
A Study Conducted for the Bureau of Reclamation's Lower Colorado Region

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

B. WATER SUPPLY RELIABILITY (continued)

Without the collaborative support we would not be able to develop our Water Conservation Plan and implement the improvements we need **to reduce** water use. Our partnership is demonstrated in several ways:

1) Voluntary seasonal fallowing program.
2) Irrigation methods that promote water use reduction (sprinklers, drip, etc.)
3) Crops that require less water
4) Helping fund 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 incidents (ranging from routine to emergencies).

Will the project Address Water Supply Reliability in Other Ways Not Described Above?

This is a small part of our Ten-Year Capital Plan to slowly modernize our water delivery systems and infrastructure to be more self-sustaining, easily managed, provide accurate and reliable data, and conserve water. We are very fortunate in that we have Priority 2 Water Rights and as such have a more than adequate supply of water. However, others are not so fortunate. And even though, water reliability has not directly impacted us, we have voluntarily been pro-active in our water conservation efforts to help the community and ourselves as demonstrated in the programs/ efforts listed above.

C. IMPLEMENTING HYDROPOWER – Not Applicable

D. COMPLEMENTING ON-FARM IRRIGATION IMPROVEMENTS

This will complement project already developed by our local NRCS office to assist growers in this area. One grower already received EQIP funding for water that passes through the Five Gate System for lining his ditches. NRCS has new projects listed for ten land parcels. Last week we held a meeting for growers about EQIP and USDA is having a workshop here in October. We also have contacted Bobbi McDermott a retired NRCS employer and she has agreed to work with our local growers. We have provided them a tentative list of accepted projects and have been with our new NRCS representative. We are also reviewing the new Regional Conservation Partnership Program and meeting with our Board to develop strategies for this new grant opportunity.

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

D. COMPLEMENTING ON-FARM IRRIGATION IMPROVEMENTS (continued)

Planned or On-going Projects by Farmers/Ranchers that Receive Water from BWD to Improve On-Farm Efficiencies:

Our local NRCS office has developed a Conservation Implementation Strategy for water conservation improvements for a total of 18 -21 fields. This report has been provided in Appendix A. A list of CIS/EQIP project sites from this report have been provided on the following page.

These irrigation efficiency improvements can be achieved by:

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

How Project will Complement Any On-going or Planned Farm Improvement:

Installing the new high-flow turn-out structures (Five Gates will compliment farmers installing larger capacity concrete ditches.

More accurate water volume delivery compliment farmers' request based on field dimensions and soil intake characteristics.

Describe the On-Farm Water Conservation or Water Use Efficiency Benefits that Are Expected to Result from any On-Farm Work:

Water Conservation and Costs Savings to Farmers

1) Reduced 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.

1. Technical Proposal and Evaluation Criteria (Continued)

D. Complementing On-Farm Irrigation Improvements (continued)

Table 1. Estimate of Bard CIS projects, practices, and budgets.

Bard, CIS - Year 1				
Field	Acres	Ditch	Structures	EQIP
Blackwell	40	1050	4	$27,100
Nelson	60	1300	4	$37,626
H. Berryman	79	1919	6	$45,587
Curtis	95	4000	12	$90,443
JV Hovater 654	36	1240	8	$44,381
Nolan	58	1608	5	$37,189
Hill dates 1	10	microjet	pump	$35,706
Total	378	11117	39	$318,032

Bard, CIS - Year 2				
Field	Acres	Ditch	Structures	EQIP
Wavers 655 (JV)	37	1240	8	$29,764
Fresh Innovation 624 (JV)	42	1265	8	$30,080
Fagundez 696 (JV)	14	510	2	$6,651
Spencer	35	1000	6	$34,121
TopFlavor	40	1000	8	$41,773
Fagundez 697 (JV)	17	560	4	$14,412
Hill dates 2	10	microjet	pump	$35,706
Total	195	5575	36	$192,507

Bard, CIS - Year 3				
Field	Acres	Ditch	Structures	EQIP
JV Amado 628	18	1061	4	$27,255
JV Homeland 629	8.3	600	2	$14,378
JV Face 605	31.5	990	8	$41,594
JV Face 606	37.5	1238	7	$44,371
JV Face 607	37	1300	5	$33,635
JV Face 608	37	1300	5	$33,635
Hill dates 3	10	microjet	pump	$35,706
Total	179.3	6489	31	$230,574

CISTotal	752.3	23181	106	$741,113

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

E. Department of the Interior Priorities

Creating a conservation stewardship legacy second only to Teddy Roosevelt: This project utilizes the most up to date scientific/engineering design coupled time-tested procedures to create a more efficient and responsive water delivery system. Located in a rural area, and sharing land with the Fort Yuma Indian Reservation, we are uniquely positioned to promote stewardship. Through our partnerships with our water users (farmers) we are creating a balance between water conservation, planning, efficiency, and cost savings. In January, local water users, encouraged us to apply for a Watershed planning Grant for a former oxbow of the Colorado River which has a series if three small lakes. Many drainage areas and riparian areas are left as buffer zones with native plants providing habitat for the Yuma Clapper Rail and Southwestern Willow Flycatcher. Low vegetation areas near the mesas and All-American Canal provide Burrowing Owl habitat. Wild at Heart a raptor rescue non-profit, has agreed to assist with habitat identification/restoration. The U of AZ has met with us about a Barn Owl project for predator control. The YPRD is part of the Lower Colorado River corridor between connecting lakes and wildlife preserves (KOFA, Cibola, Mittry Lake, Hidden Shores, Lake Martinez). Our district is included in the Lower Colorado River Multi-species Conservation Plan.

Utilizing our natural resources: We have limited natural resources in the desert environment, other than water. We are using a "Best Practices" model by **conserving, protecting, and restoring** our natural resources (water and subsequent watersheds and habitats) by a variety of voluntary activities as previously discussed (seasonal fallowing, irrigation method, crop vs. water requirements, system improvements, etc.).

Restoring trust with local communities: As a small close-knit community, our trust has been tried and tested through several generations. We have depended upon each other for many years. We continue to foster that trust through our friendships, partnerships and public meetings. We work together with local, county, state, and Federal agencies (BIA, USBR and UFWS) as well as the Quechan Tribe. We work closely with the Audubon Society (bird surveys), USFW (joint rescue efforts for deer in All American Canal), and the City of Yuma Wetlands/River projects. Our office is in Bard, surrounded by farmland. We and our staff are always assessible while working at various locations or at the office. Many of our workers and their parents have lived in this area for many years and have been involved in farming. Tribal families have lived on their land for four or five generations.

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

E. Department of Interiors Priorities *(continued)*

Striking a regulatory balance: We primarily work together to support our community, lifestyles, and our resources. Lately, our only regulatory challenges are the environmental compliance requirements for projects, but most of these areas are farmland and already disturbed. We work with local, county, state, and Federal agencies (BIA, USBR and UFWS) as well as the Quechan Tribe to resolve any issues. Watershed/riparian areas, drainages, and washes form a buffer zone and are not utilized. We have not been involved in water mitigation activities for many years. We have an attorney on-staff to provide legal counsel as needed. Our elected BWD Board addresses and votes on issues.

Modernizing our infrastructure:

We are diligently pursuing all funding opportunities to improve and maintain our aging system. This has always included our water users' voluntary contributions. Our only limiting factor, is funding because these projects are quite costly. We have approximately 67 miles of canals, laterals, and ditches (30% lined) and 465 check gate structures of which the majority needs to be replaced as well as their peripheral structures. Our water users recently pledged $25/acre for Capital Improvements. They also provide a percent of their fallowing funds for system efficiency improvements. They are very supportive of any funding we receive to help to correct system deficiencies as well as improving our system efficiency.

F. PROJECT IMPLEMENTATION

Project Planning:

This project has been in the planning stages for the last 16 years, but in 2017 this became a reality when USBR listed it as a Priority 1 in the USBR Reservation System Evaluation Project conducted in January 2017: *Technical Memorandum No USBR 35-RDE-8150-STY-2016-02.* It is also identified as our **Number One** priority in our Ten-Year Capital Improvement Plan. The only reason it has not been implemented is because it is a large project and the costs are prohibitive. We have been successful leveraging funding for small projects with lees competitive funding sources (Small-Scale and Lower Colorado River Region) and have developed a strategy to complete projects in 2-4 Phases in order to be able to leverage our 50% funding match. For this project we received an award in 2018 to complete the Engineering and Design component (Completion December 2019). 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 (20-30%). As the Five Gate construction must be completed in one phase, our only option is to try to gain funding for the entire construction project. We have met with USBR, our Engineering/Design contractors and discussed this project many times. We have tried to develop a strategy to succeed. We will have the Engineering and Design component done in December enabling us to start the project upon Notice to Proceed.

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

F. PROJECT IMPLEMENTATION

Project Planning:

Additional Report/Studies Include (See Appendix A for Excerpts):
Five Gates Structure Replacement Foundation Recommendations May 2018
BOR Technical Service Center Denver Colorado

Five Gates Structures Elevations – USBR Yuma Office – 2018

Five Gate Diversion Structure Replacement – Value Engineering Report
A Study Conducted for the Bureau of Reclamation's Lower Colorado Region (See Appendix B)

Readiness to Proceed: Tasks and Milestones with Tentative Schedule

Milestone/Task/Activity	Planned Start Dates and End Dates				
Environmental Compliance	March				
USBR - NTP	April				
Planning/Meetings/Scheduling	April	May ➡	June ➡	July	
Procurement/Bids	April	May ➡	June		
Gate Fabrication		May			
Site Preparation		May			
By-Pass Installation (Shotcrete Channel)			May		
Demolition				June	
Earthwork				July	
Gates/New Turnouts				July	
Lining and Appurtenances				July	
Tie-Ends			June ➡	July	
Project Closeout/Report/Deliverables					Dec

Preliminary Engineering Design/Plan has been provided in Appendix A.

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

F. PROJECT IMPLEMENTATION

Performance Measures:

Water Saved or Better Managed:

Pre-project Estimation:

We have already completed the following tests that are included in our Water Conservation Plan.

Inflow/Outflow: Data is collected whenever water is released. This is incorporated into our data base. We can generate report for early and late seasons adding the ratio of acre-feet diverted to acre-feet received to calculate efficiency.

Post-Project Methods:

Pre-project results will be compared with Post-project results to calculate water savings. We will compare ratio of acre-feet diverted to acre-feet received to calculate efficiency.

Measuring Devices:

A Long-throated flume with 2 remote monitoring units are going to be installed on the Reservation Main Canal (Upstream from Five Gates).

G. NEXUS TO RECLAMATION PROJECT ACTIVITIES

The Colorado River is the source of our water supply via the All – American Canal. The BWD approved diversion request is approximately 51,000 acre/feet per year. The Indian Unit's approved diversion request is approximately 49,000 acre/feet per year.

The Yuma Project is a Federal Reclamation Project. Work began on the distribution system of the Reservation Division in 1909 and the patented land was opened to settlers in 1910. With the construction of the Laguna Dam from 1905-1909, approximately 38,000-acre feet per year were provided to the non-Indian sections. The Bard Irrigation District was organized in 1927 to represent landowners in the Bard District. Water for the project was diverted from the Laguna Dam. Later after the construction of the Imperial Diversion Dam (1938), 5 miles upriver and the completion of the All-American Canal (1941), irrigation for the Reservation Division was diverted from 5 turnouts along the All-American Canal. This included the Siphon Drop Power Plant for the Indian Unit and the Yuma Main Canal for the Valley Division in located in Arizona.

On December 1, 1978, the Bard Irrigation District was renamed the Bard Water District. In March 1981, the Bard Water District entered into a contract with the U.S. Bureau of Reclamation (USBR) for the operation and maintenance of the Bard Unit, In January 1983, BWD entered into an additional contract to operate and maintain the Indian Unit facilities. The Indian Unit Water Users pay the Bureau of Indian Affairs (BIA) their O & M costs, then these funds pass through to the USBR and eventually BWD is compensated.

1. Technical Proposal and Evaluation Criteria (Continued)

1.5 Evaluation Criteria (continued)

G. Nexus to Reclamation Project Activities

The Bard water users originally contracted (beginning in 1909) with the USBR under Present Perfected Rights to provide water under this pre-existing agreement. Bard's consumption is based upon these farm units. The Yuma Project Reservation District (YRPD) are able to divert all the water needed for crops; not to exceed 25,000 acres per year. The Bard Water District is just below the Laguna Dam, the first dam built on the Colorado River to divert water for the Yuma Project. The Bard Unit is part of the Yuma Project Reservation Division and has 2nd Priority Water under the California Seven Party Agreement. Return water flows back into the Colorado River and continues to Mexico as specified by the International Agreement.

Currently, the Bard Water District operates and maintains 67 miles (353,760 Linear Feet) of irrigation ditches and canals; only 30% are lined with concrete or concrete piping. There are 465 (Check Gates and Delivery Gates) and YPRD diverts approximately 90,000 acre feet per year to irrigate approximately 15,000 acres. Efforts to conserve water are challenging in Bard's rapidly aging system, but Bard works closely with the USBR to be pro-active in addressing these issues. This proposed Five Gate project (Reservation Main Canal) was originally constructed as part of the 1909 Yuma Project.

H. Additional Non-Federal Funding

Our funding will be the 50% from our Water User's commitment to provide BWD $25/acre for Capital Improvements each year (approximately $375,000) and their contribution from fallowing to improve system efficiency. The In-Kind will be our Labor and use of our Heavy Equipment. This design is for five check gates as well as for the diversion channel required to keep the water users supplied during their year-round growing season. The original structure as described in the Technical Memorandum is *Structurally it is seriously deteriorated. The concrete is deteriorating, and some gates are non-operational.* ***The structure is not functioning how it was designed to;*** *only a few of the gates are operating , making a choking point for flows.* So extensive work must be done to correct and replace the structure.

The Engineering/Design portion for this project is critical for initiation of the construction project. In February of this year, the Quechan Indian Tribe applied for funding for the entire project under the Drought program but were unsuccessful. We are taking a more conservative approach, so we can leverage funding and resources from ourselves (In-kind and Bard Water Users-Capital Improvement funds) as well as the Quechan Tribe with USBR or other matching funds in a step by step process. The construction has been separated into 3 phases by USBR which would allow us a more reasonable 2-3 year approach. **Without this funding for the critical design and engineering phase we cannot proceed**, even with our Water User's commitment to providing BWD $25/acre for Capital Improvements each year, (approximately $375,000) this would take all our funding for other projects away for at least five years and delay the project significantly. This would put the BWD's system at considerable risk, diverting all our funds to only one project. The 50% matching funds help tremendously for these costly projects.

2. Project Budget

2.1 Funding Plan and Letters of Commitment

Summary of Non-Federal and Federal Funding Sources

SOURCE	AMOUNT
Costs to be reimbursed with the required Federal funding (49.09%)	$300,000
Costs to be paid by BWD (50.91%)	$342,294
Value of third-party contributions	$0
TOTAL PROJECT COSTS	$642,294

In-kind and cash contribution will be provided by the Bard Water District. We will utilize our staff and heavy equipment. Bard will prepare the site, provide support during installation and construction and remove debris and material at completion.

The non-Federal share of this project (53%) will be provided by the following:

5% of Total Quechan Indian Tribe (QIT) – *$32,114* (9% of BWD Matching)
Committed to Project, Applied for Drought funding in February 2018 but were unsuccessful
Cash: Contractual $34,229

48% of Total Bard Water District – $310,180
In-kind Contributions: Labor $51,128 + Fringe $32,776 + Equipment $178,400 + Indirect Costs $58,390
Cash: Contractual $10,514

2. Project Budget (continued)

2.2 Budget Proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Limit	Quantity		
Salaries and Wages				
Project Manager	$41.66	480	HRS	$19,996.80
Water Master	$24.50	360	HRS	$8,820.00
Equipment Operators (2)	$19.14	480	HRS	$9,187.20
Gate Fabricator	$18.38	160	HRS	$2,940.80
Laborers (2)	$13.28	640	HRS	$8,499.20
Administrative Asst.	$21.00	80	HRS	$1,680.00
Contract & Grant Specialist	$18.00	240	HRS	$4.320.00
Subtotal Salaries and Wages				**$51,128.32**
Fringe Benefits				
Project Manager (41.45%)	$17.27	480	HRS	$8,289.60
Water Master (39.76%)	$9.74	360	HRS	$3,506.40
Equipment Operators - 2 (48.22%)	$9.23	480	HRS	$4,430.40
Gate Fabricator (50.82%)	$9.34	160	HRS	$1,494.40
Laborers - 2 (61.60%)	$22.04	640	HRS	$14,105.60
Administrative Asst. (36.52%)	$7.67	80	HRS	$613.60
Contract & Grant Specialist (7.78%)	$1.40	240	HRS	$336.00
Subtotal Fringe				**$32,776.00**
Equipment (Bard Water District)				
Front End Loader CAT 938G	$150.00	160	HRS	$24000.00
Rubber Tired Excavator CAT M318F	$155.00	160	HRS	$24,800.00
Excavator 330 C	$165.00	160	HRS	$26,400.00
Dump Truck -GMC	$85.00	160	HRS	$13600.00
Dump Truck – Kenworth	$135.00	160	HRS	$21,600.00
Water Truck – GMC	$85.00	160	HRS	$13,600.00
Service Truck 1 Ton 2000 Ford	$90.00	480	HRS	$43,200.00
Project Manager Truck	$35.00	320	HRS	$11,200.00
Subtotal Equipment				**$178,400.00**
Supplies and Materials				
Safety Supplies	$3,000.00	1	LS	$3,000.00
Fill Dirt	$10.00	2,000	CU YD	$20,000.00
Concrete	$120.00	600	CU YD	$72,000.00
Forms/Traverse Structures	$6,000.00	1	LS	$6,000.00
Pipelines 8 Ft Sections, 3 Diameters 36"x 10 @ $760, 42"x20 @ $1000, 60"x 40 @ $1800	$99,600,00	1	LS	$99,600.00
Gates - Metal	$4,000.00	5	EA	$20,000.00
Subtotal Supplies and Materials				**$220,600.00**

2. Project Budget (continued)

2.2 Budget Proposal (Continued)

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Limit	Quantity		
Contractual/Construction				
Construction Management Include On-site Engineering/Survey	$94,000.00	1	LS	$94,000.00
Concrete Testing	$6,000.00	1	LS	$6,000.00
Subtotal Contractual/Construction				**$100,000.00**
Env. and Regulatory Compliance				**$1,000.00**
TOTAL DIRECT COSTS				**583,904.32**
Indirect Costs De-Minimus	10%			**58,390.43**
TOTAL ESTIMATED PROJECT COSTS				**$642,294.75**

2.3 Budget Narrative

Salaries and Wages:

Project Manager: Nick Bahr – Project Management

Key Personnel: Water Master – Shawn Weddle – Assist Project Manager
Equipment Operators – Site Earthwork and Installation
Laborers – Site Earthwork and Installation
Gate Fabricator – On-site Installation/Modifications
Administrative Asst – Payroll/Accounts Payable Tracking
Contracts & Grants Specialist – Arlene Kingery Documents, Changes, Reports, Tracking

The Bard Water District certifies that the labor rates included in the budget proposal represent the actual labor rates of the identified personnel.

Fringe: Fixed rate for each employee category for all work done by Bard Employees.
See Budget Proposal on Page 24

Travel: No Travel Required

Equipment: Will use Bard equipment (Bard Schedule)
Front End Loader – site preparation, Load Dirt, and final cleanup, installation
Excavators – Site preparation, Earthwork, and final cleanup, installation
Dump Trucks – Haul away construction debris and material – Deliver Fill Dirt
Water Truck – Dust Control
Service Truck – Used in support of Bard Crew on-site
Project Manager Truck – project management at site

2. Project Budget (continued)

2.3 Budget Narrative (continued)

Materials and Supplies:

Safety: Barriers, Level D Personal Vests, glasses, hard hats, gloves; Drinking Water
Concrete for Appurtenances (Aprons, Tie-Ends, Frame, Sidewalls, etc.)
Pipe (See detail on budget page 24) – Fortera (Estimate)
Fill Dirt to bring to required slope/grade
Forms/2 Transverse Joints/Structures for Concrete work

Contractual:

On-Site Construction Management – George Cairo (Estimate)
Concrete Testing - Geotechnical Services, Inc.

Other:

Environmental Regulatory Compliance Costs: Verbal Quote from Yuma BOR
Earth disturbing activities done in partnership with BOR

Indirect Cost Rate: NO approved government rate so use De-Minimus on total Direct Costs

3. Environmental and Cultural Resources Compliance

Due to the nature of this project, ground-disturbing activities will be conducted. The Bard Water District will work closely with the USBR to ensure all environmental compliance requirements are met before NTP. We already have working relationships with local, county, state, and Federal agencies (BIA, USBR and UFWS) as well as the Quechan Tribe. We have provided our initial responses in this proposal for your review.

3.1 Impact to Surrounding Environment

No significant impact, no earth-disturbing activities will occur for this Engineering/Design project.

3.2 Threatened or Endangered Species, or Designated Critical Habitat

This area is greatly disturbed and in constant agricultural use. There are no threatened or endangered species present, critical habitat or culturally sensitive species (Quechan Tribe).

3.3 Wetlands or Other Surface Waters (CWA – Waters of the United States

There are no wetlands within the project boundary.

3.4 Water Deliver System Date of Construction

The Five Gates were part of the Yuma Project Reservation Division and was constructed in 1909.

3.5 Modifications or Effects to Individual Features of a Delivery System (i.e., head gates, canals, or flumes) There will be no effect on the existing delivery system during this Engineering/Design project.

3.6 Features in the Bard Irrigation District Listed or Eligible for Listed on the National Register of Historic Places These include The All- American Canal, USBR Dams, Head Gates, and Retention Areas, Old Southern Pacific Rail Line and Bridges, Fort Yuma, Pothole, Petroglyphs.

3.7 Archaeological Sites in Proposed Project Area

There are no archaeological sites in the project area.

3.8 Disproportionately High or Adverse Effects on Low Income or Minority Populations

No disproportionally high or adverse effects on low income or minority populations.

3.9 Limit Access to and Ceremonial Use of Indian Sacred Sites or Impact on Tribal Lands

Not limit access to and ceremonial use of sacred sites or impact Tribal lands.

3.10 Contribution to Introduction, Continued Existence, or Spread of Noxious Weeds or Non-Native Invasive Species This project will not contribute to the introduction, continued existence, or spread of noxious weeds and non-native invasive species.

3. Required Permits or Approvals

There are no permits or approval required for this project.

4. Letters of Support

Resolution **WILL BE PROVIDED BY** November 3, 2019.

APPENDIX A

Preliminary Engineering Design/Plan

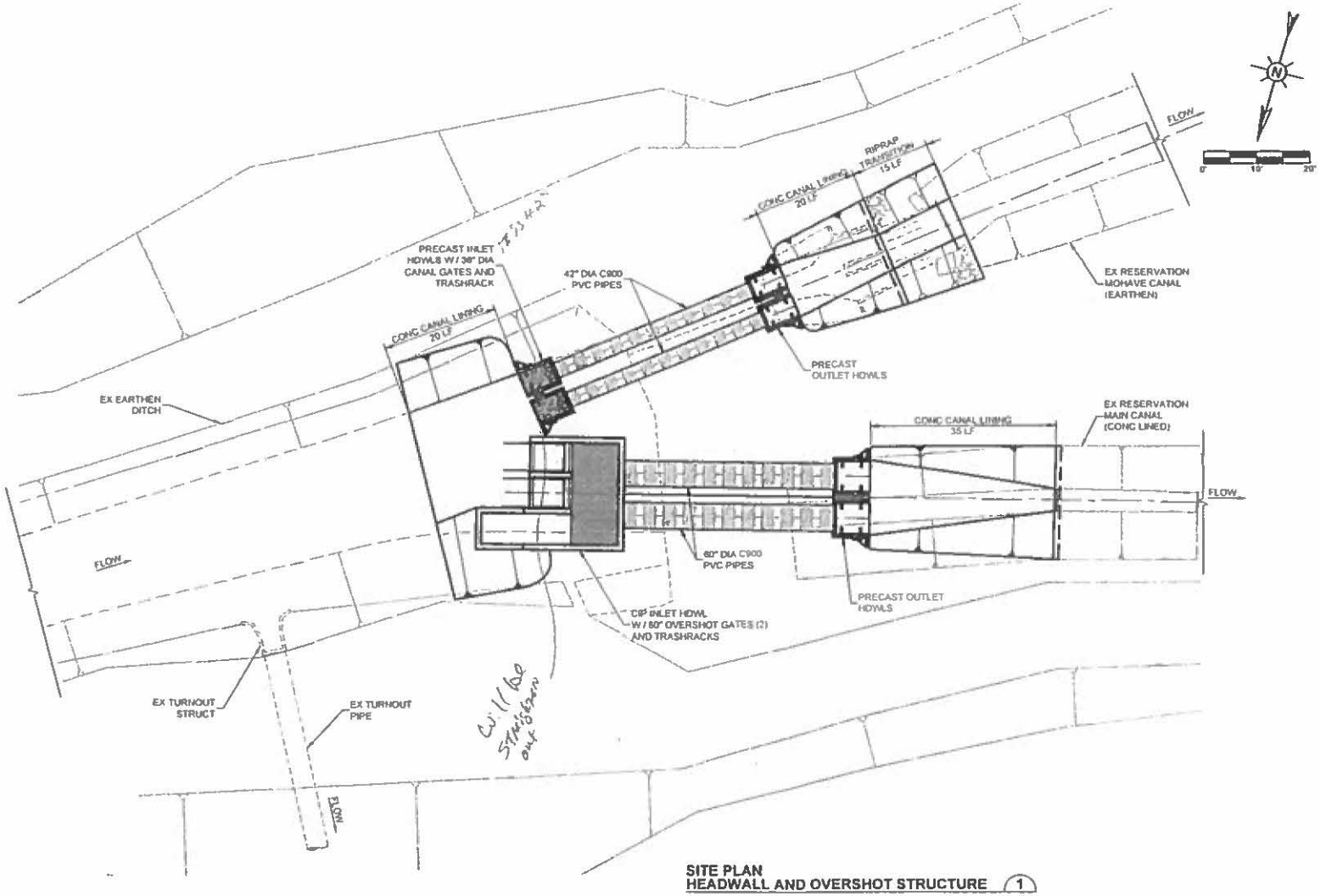
Excerpts Referenced Documents

USBR Reservation System Evaluation Project conducted in January 2017
Technical Memorandum No. 35-RDE-8150-STY-2016-02 – Hydrologic Report

Five Gates Structure Replacement Foundation Recommendations May 2018
BOR Technical Service Center Denver Colorado

Five Gate Diversion Structure Replacement – Value Engineering Report
A Study Conducted for the Bureau of Reclamation's Lower Colorado Region

Conservation Implementation Strategy Bard, CA Imperial County, Irrigation Improvement Project, Steve Reddy – District Conservationist, NRCS Yuma, AZ.



SITE PLAN
HEADWALL AND OVERSHOT STRUCTURE (1)

DIGALERT
800-227-2600

REV	DATE	REVISION DESCRIPTION	BY

GCE inc
GEORGE CAIRO ENGINEERING, INC.
STAPLEY CENTER
1630 S. STAPLEY DR. SUITE 117
MESA, ARIZONA 85204
WWW.GCAIROINC.COM

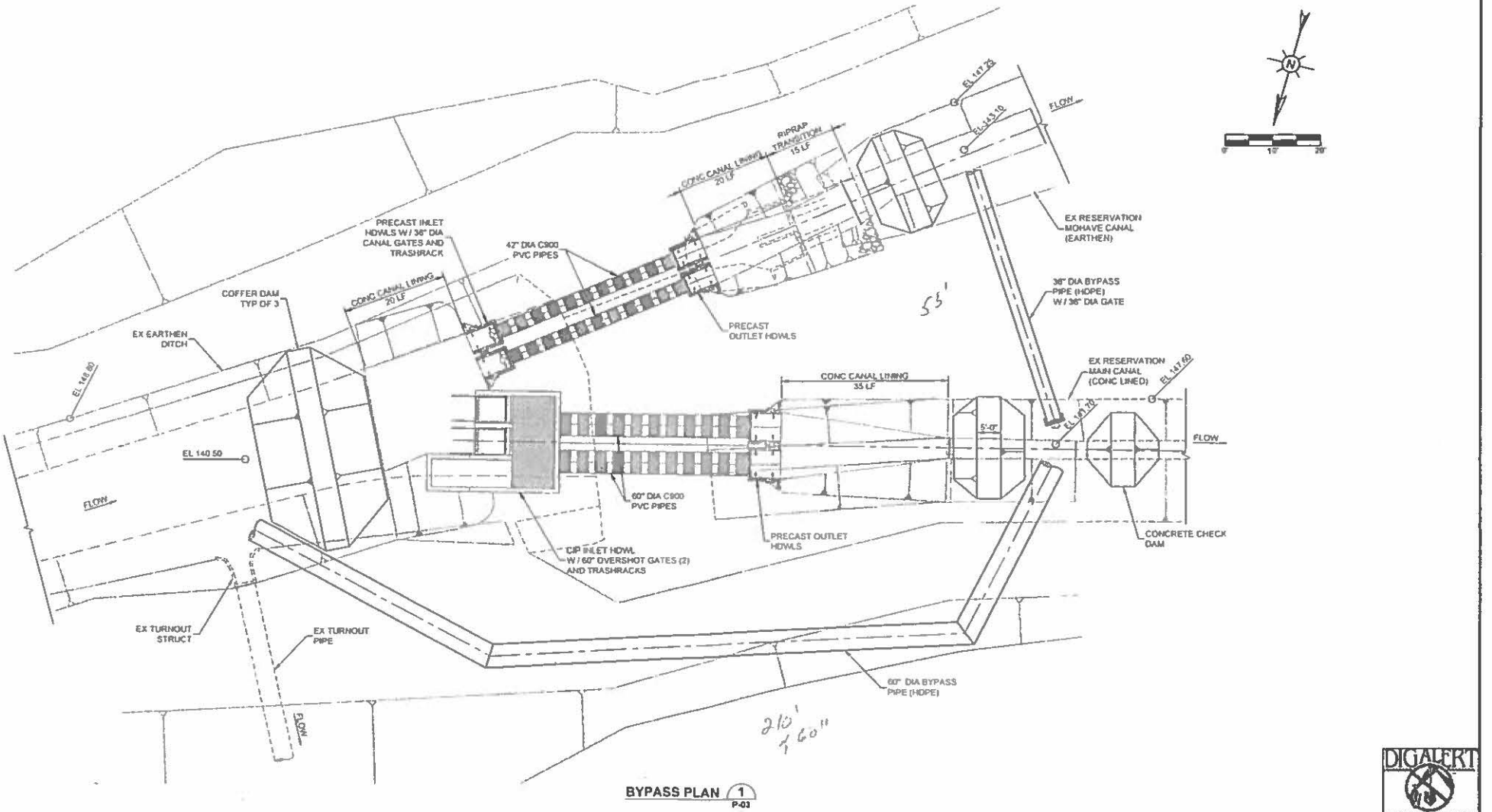
DESIGNED BY	R. RILEY
DRAWN BY	R. EVANS
APPROVED BY	G. CAIRO
DRAWING	BWD-05
PLOT DATE	AUG., 2019

BARD WATER DISTRICT
1473 ROSS RD
WINTERHAVEN, CA 92283
(760) 572-0704

SITE PLAN
PRECAST INLET AND
OUTLET STRUCTURES

SP-1

1 OF -



BYPASS PLAN (1) P-03

DIGALERT 800-227-2600

REV.	DATE	REVISION DESCRIPTION	BY

GCE inc.
GEORGE CAIRO ENGINEERING, INC.
STAPLEY CENTER
1630 S. STAPLEY DR. SUITE 117
MESA, ARIZONA 85204
WWW.GCAIROINC.COM

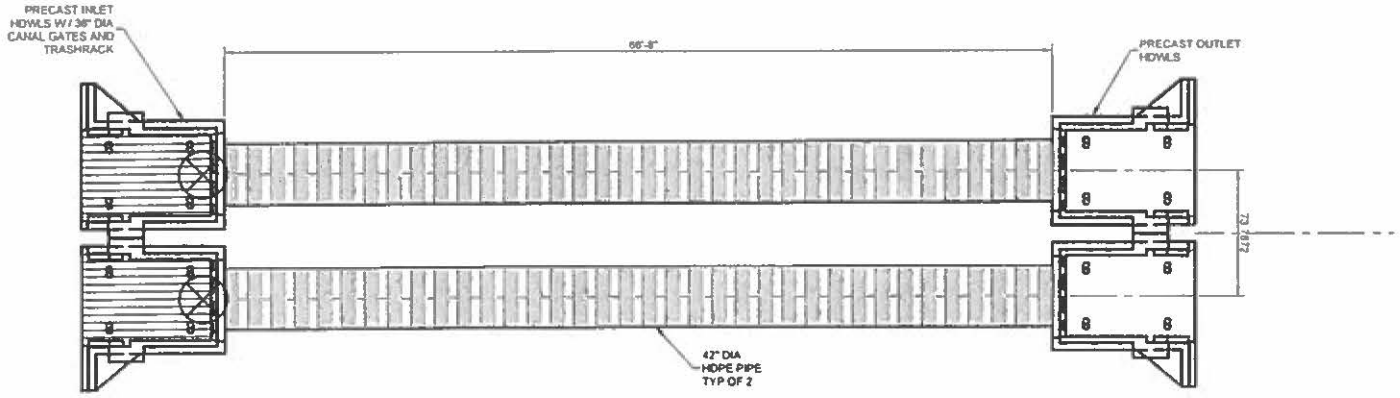
DESIGNED BY	R. RILEY
DRAWN BY	R. EVANS
APPROVED BY	G. CAIRO
DRAWING	BWD-06
PLOT DATE	AUG., 2019

BARD WATER DISTRICT
1473 ROSS RD
WINTERHAVEN, CA 92283
(760) 572-0704

SITE PLAN
BYPASS PLAN

SP-2

2 OF -



MOHAVE TURNOUT STRUCTURE PLAN (1)
SCALE: 1"= 3'-0"

DIGALERT 800-227-2600

REV	DATE	REVISION DESCRIPTION	BY

GCE inc
GEORGE CAIRO ENGINEERING, INC.
STAPLEY CENTER
1630 S. STAPLEY DR SUITE 117
MESA, ARIZONA 85204
WWW.GCAIROINC.COM

DESIGNED BY	R. RILEY
DRAWN BY	R. EVANS
APPROVED BY	G. CAIRO
DRAWING	BWD-05
PLOT DATE	AUG., 2019

BARD WATER DISTRICT
1473 ROSS RD
WINTERHAVEN, CA 92283
(760) 572-0704

MOHAVE TURNOUT STRUCTURE PLAN

S-2

4 OF -

31

RECLAMATION

Managing Water in the West

Reservation Division System Evaluation Technical Memorandums

Yuma Project Reservation Division, Lower Colorado Region

U.S. Department of the Interior
Bureau of Reclamation

January 2017

RECLAMATION
Managing Water in the West

Technical Report No. SRH-2016-15

Hydraulic Model Results for the Reservation Division Canal Capacity Assessment

Yuma Project Reservation Division
Lower Colorado Region

U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

33

July 2016

2.2.3.3 Gated Culverts

Sluice gates exist upstream of many culverts to control the flow into the canal. HEC-RAS does not have gated culverts as a pre-defined structure; however, stringing a series of nodes together can effectively simulate the hydraulics. The sluice gate was modeled just upstream of the culvert and a cross section was inserted immediately downstream of the gate. A lid and obstructions were added to the cross section between the gate and culvert to concentrate flow within the open gate area as shown in figure 10.

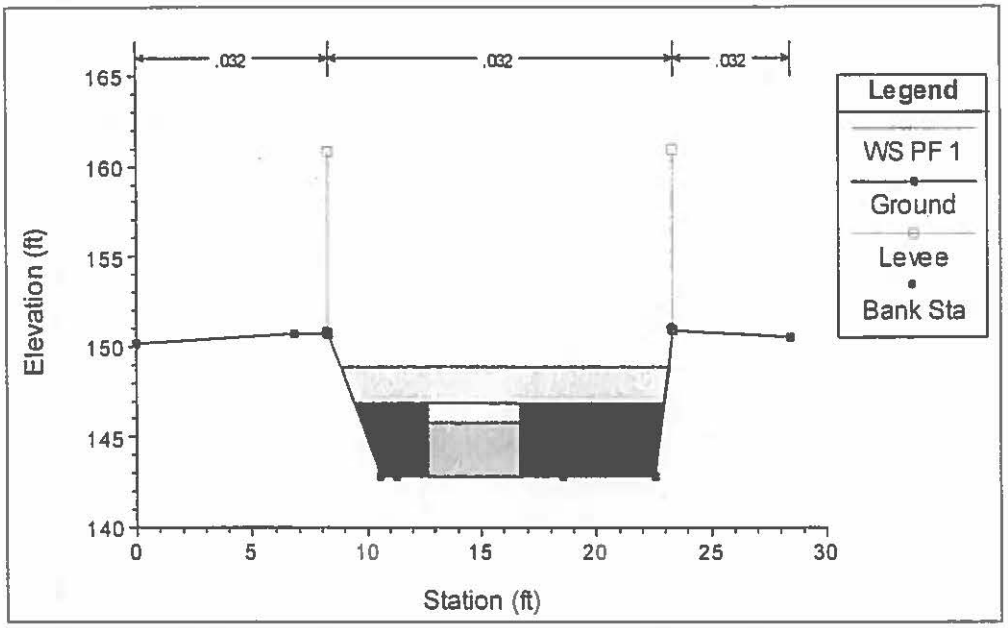


Figure 10.—Cross Section in between gate and culvert with a lid and obstructions to model a gated culvert (Area F Acoma-1 XS 11757.91).

Typically, these gated culverts occur at a lateral to control the discharge. However, a series of gated culverts is located in Area F where the Mohave Canal turnout occurs along the Main Canal. The gated culverts at this location will be referred to as "Five Gates" and is pictured in figure 11. Gate #1 is a turnout to the Mohave Canal. Gate #2 and #3 control the amount of flow entering Main Canal. Gate #4 is not operational and it was modeled as completely closed during both the calibration and capacity modeling steps. Gate #5 is an overflow culvert to avoid embankment overtopping (figure 12), and was modeled as completely open during calibration efforts and capacity testing.

To effectively simulate the hydraulics surrounding the Five Gates Structure, the Mohave and Main Canal were split into two different geometry files. Both files contained the same inline structure, gates, and culverts. However, to properly simulate flow partitioning, obstructions were added to the cross section geometry, as seen in figure 13. For example, the geometry for the Main Canal blocked off

the left culvert, which delivers flow to the Mohave Canal. Likewise, the Mohave Canal geometry would have the right culvert obstructed, to retain the flow in the Mohave Canal.

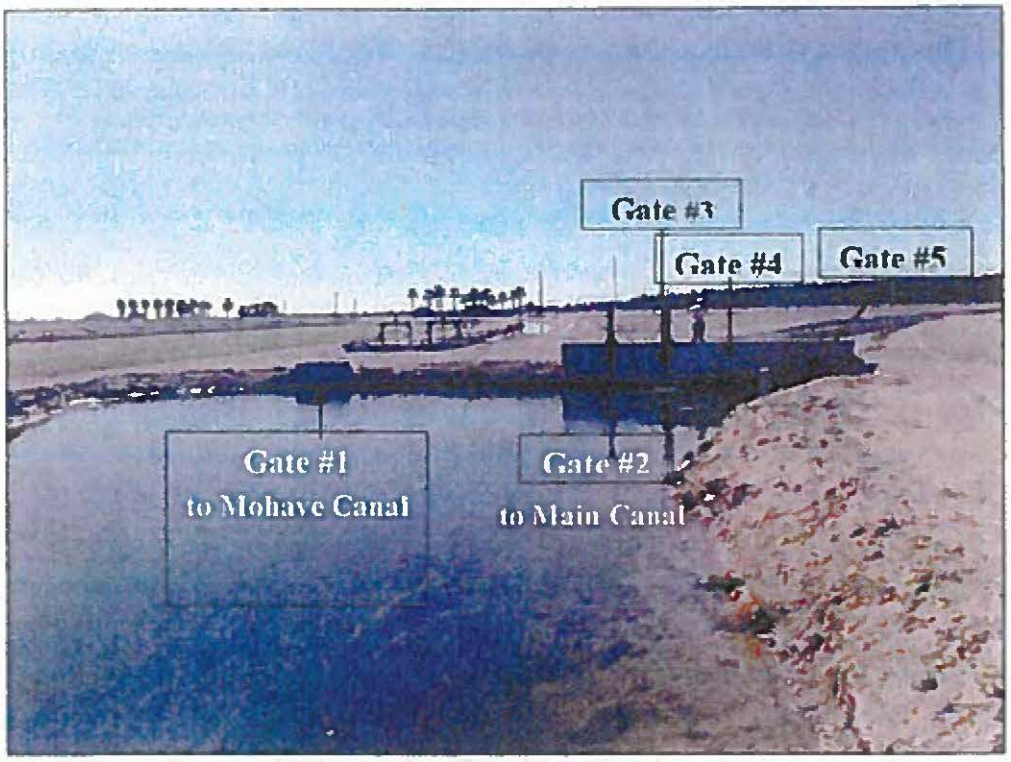


Figure 11.—Five Gates gated culvert where Main Canal splits into Mohave (through Gate #1) and continues through Areas E and F (Gates #2-5).

Figure 12.—Gate #5 in Five Gates is an overflow culvert.

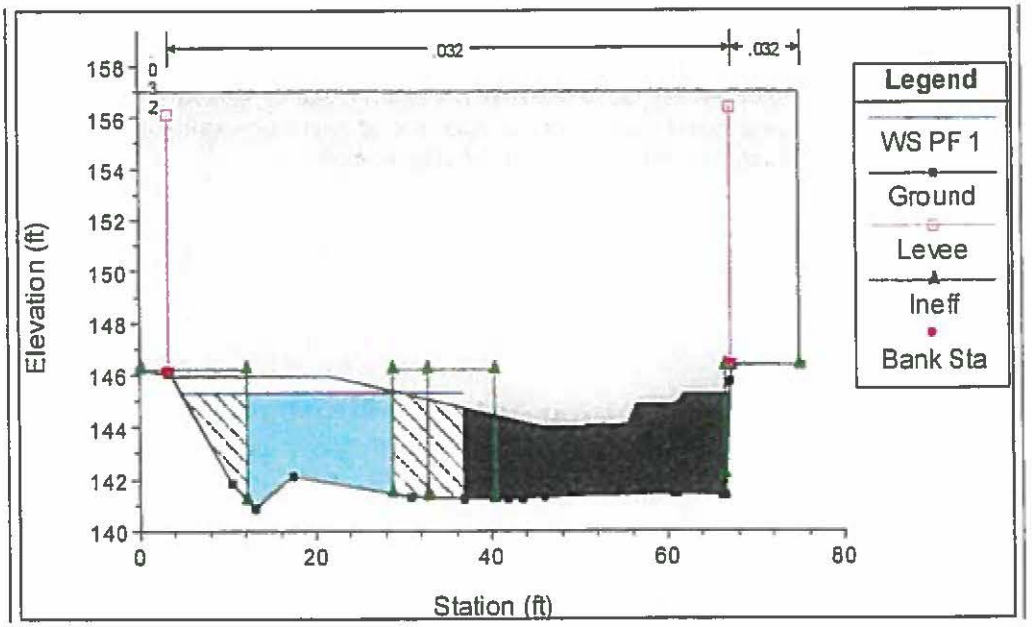


Figure 13.—Obstructions were placed to correctly split the flow at Five Gates (Area F Mohave – 4 XS12720.4). Also shown in this graphic are levees, bank stations, and ineffective flow areas ("Ineff").

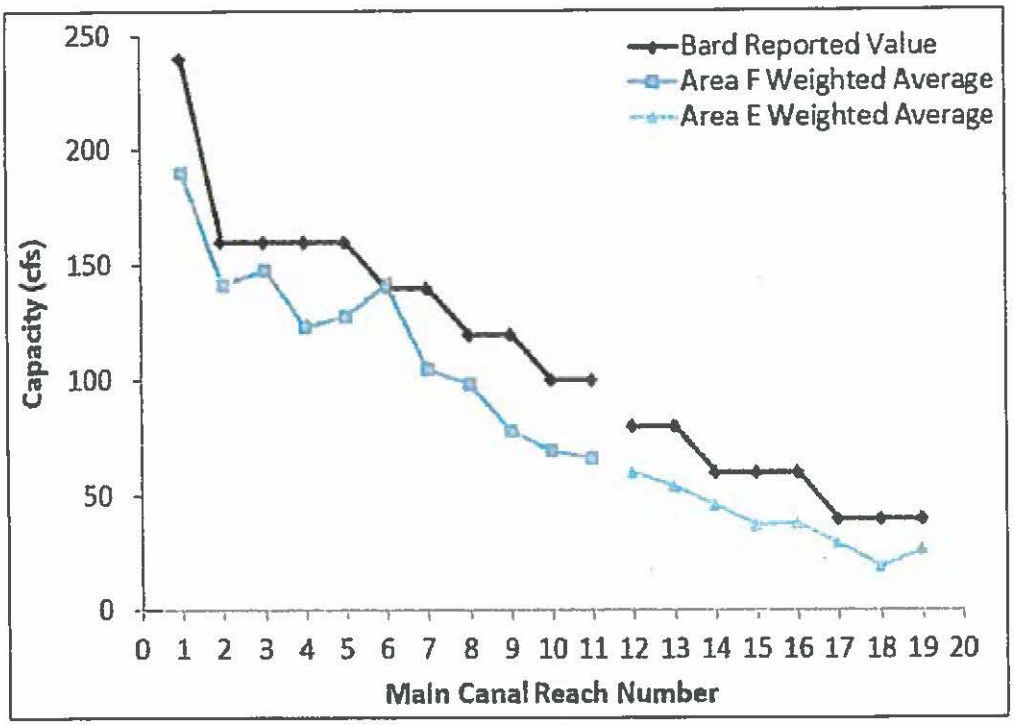


Figure 64.—Comparison of average canal capacity along Main Canal. Calibration data were available for reaches 1 through 15.

Figure 65.—Main Canal photographs highlighting sedimentation and vegetation in both unlined and lined portions of the canal.

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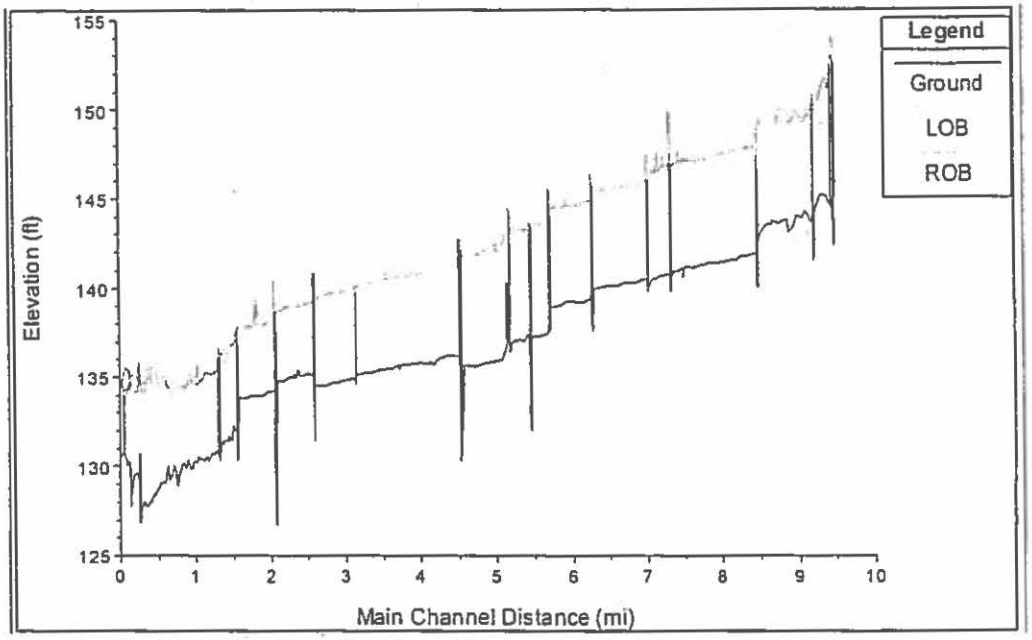

Figure 66.—Main Canal profile plot. The ground and structures are represented with black solid lines while the left and right overbanks (LOB and ROB, respectively) are denoted with dotted and dashed red and blue lines. Notice that the slope does not consistently decrease along the entire reach.

3.2.5.2 Five Gates Structure

The bottleneck of the largest magnitude in the system occurred along Main Canal at "Five Gates," where the Mohave turnout occurs along Main Canal. This structure was presented in section 2.2.3.3 and in figure 11 and consists of four sluice gates and an overspill culvert (Gate #5). The capacity results surrounding this structure are presented in figure 67. The capacity of the canal approaching the structure is approximately 142cfs. The total capacity of four out of the five operational gates is 55cfs, which feeds both the downstream Main and Mohave Canals. The culvert transporting water to the Main Canal has a capacity of approximately 104cfs, while the culvert transporting water to the Mohave Canal has an estimated capacity of 48cfs. Moving downstream, the Main Canal has a capacity of 118cfs, while the Mohave Canal is limited to 24cfs. However, these culverts and downstream reaches are both limited to the 55cfs that can be passed through the gates at the Five Gates headwall. Therefore, the full capacity of the Main Canal downstream of Five Gates cannot be fully utilized due to the limitation at the gates.

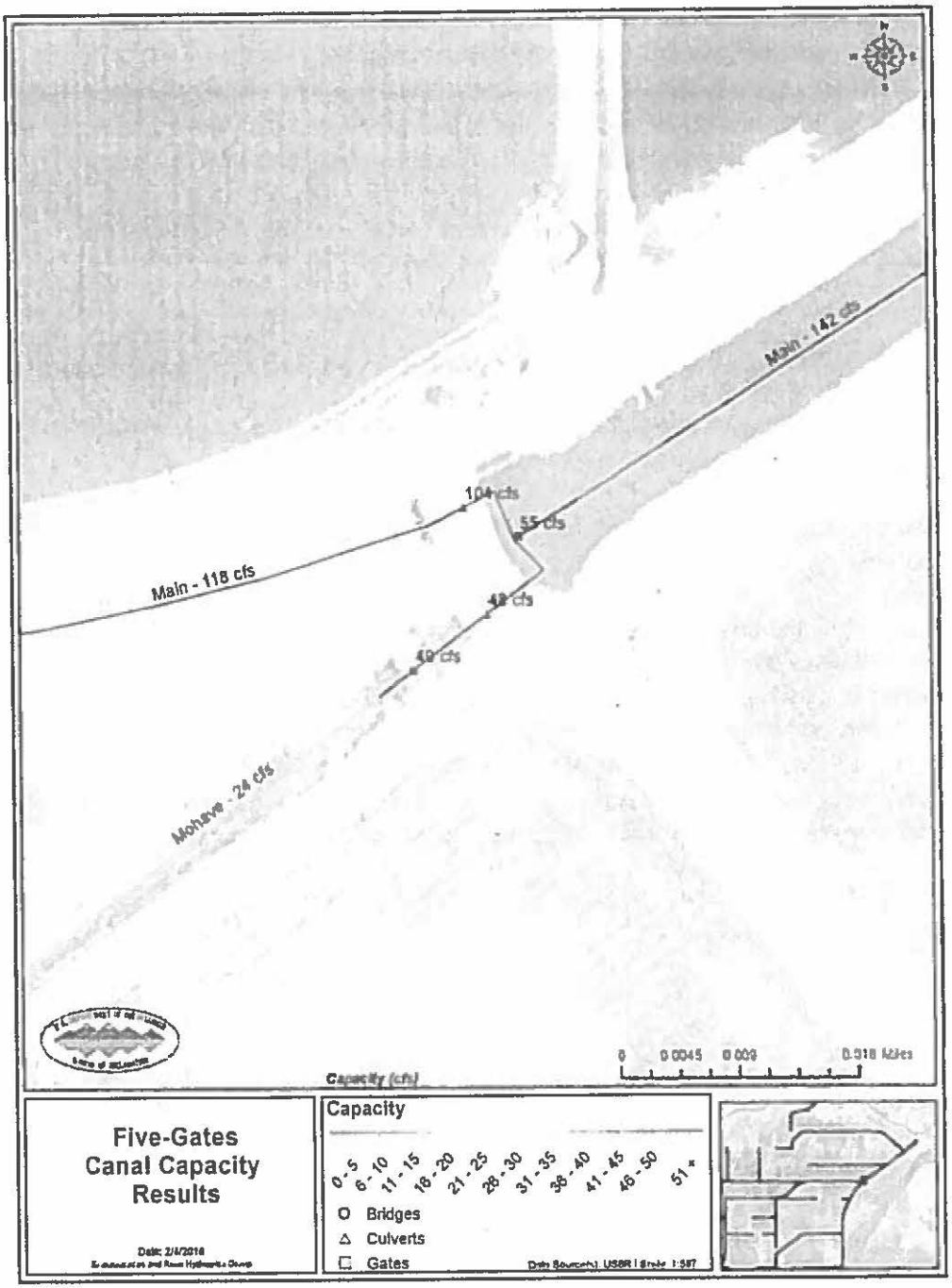

Figure 67.—Capacity results surrounding the Five Gates structure in Area F on the Main Canal and at the start of the Mohave Canal. Note that the limiting factor for maximizing canal capacity is the gated structure on the headwall.

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4. Limitations and Recommendations

4.1 Limitations

Limitations of this study are associated with the use of the HEC-RAS model, limited calibration data, and canal conditions. Due to the limitations of the modeling endeavor presented in the following paragraphs, it is recommended that the product of this study be utilized as a comparison tool rather than an absolute value.

The HEC-RAS steady flow module was designed to perform one-dimensional (1D) hydraulic calculations for steady or gradually varied flow (Brunner, 2010). Its application to a dendritic canal system is appropriate. However, there are some limitations due to assumed steady or gradually varied flow, 1D calculations, and available structures. Firstly, unlike most river systems, abrupt changes in flow discharge and hydraulic controls (such as structures) are necessary in canal systems to allocate appropriate water volumes. Due to the dynamic nature of canal systems, steady or gradually varied flow may not be an accurate assumption. For the appraisal level of this study, steady or gradually varied flow assumptions are appropriate. One-dimensional modeling is appropriate for the application of canal systems, as the majority of the flow moves in the longitudinal direction. However, at turnouts and split flow locations 1D modeling is limiting as horizontal velocity components become more influential. As discussed in section 3.2.4, the capacity of a canal upstream of a junction will increase if both downstream canals are in operation. Assessing each operation scenario was not included in the scope of work; therefore, the estimates in this study may not reflect the true maximum capacity of the system.

HEC-RAS has the capability of modeling several hydraulic structures such as: bridges, culverts, gated spillways, overflow weirs, drop structures, and lateral structures. However, it does not have the capability of modeling a gated-culvert such as those found throughout the Yuma Project Reservation Division Canal System. Therefore, some judgement was necessary to build these structures within the model geometry. The calibration dataset aided in understanding the appropriate loss through these structures for a given discharge. However, a more robust calibration dataset would give a more thorough understanding of the hydraulic loss associated with gated culverts at a variety of discharges.

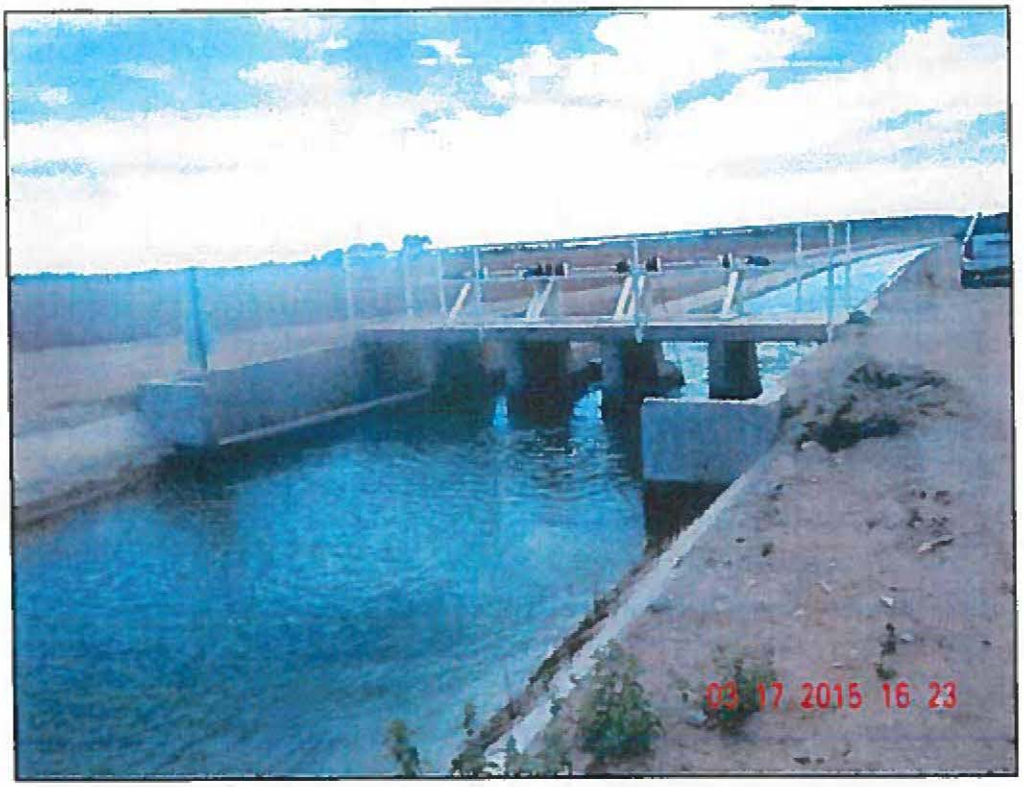
The calibration dataset scoped for this study included one flow event for all operating canals. While this provided a reasonable means to calibrate the model, it is not a robust calibration as the calibration parameter values will likely change for each flow event and canal operation scenario. Had the calibration dataset included multiple flow events, the calibration parameter values would have been averaged to better represent the hydraulics of the system. However, calibration to one flow event is appropriate, as this model is intended to be utilized as a comparative tool.

RECLAMATION
Managing Water in the West

Technical Memorandum No. 35-RDE-8150-STY-2016-02

Physical Assessment and Evaluation of Irrigation Delivery System

Yuma Project Reservation Division
Lower Colorado Region



U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

July 2016

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RECLAMATION

Managing Water in the West

Five Gates Structure Replacement Foundation Recommendations

Yuma Project
Lower Colorado Region

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U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

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May 2018

Managing Water in the West

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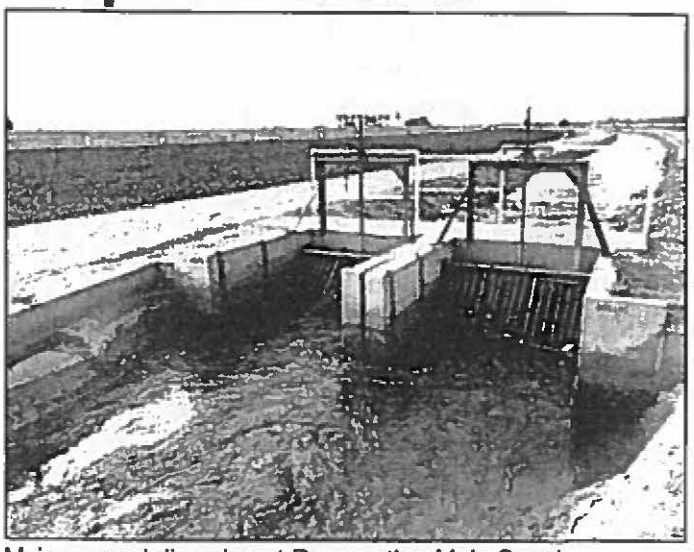
Draft Value Engineering Report
(Not for Distribution)

Five Gates Diversion Structure Replacement



Mojave canal diversion at Reservation Main Canal.
BOR photo

A Study Conducted for the Bureau of Reclamation's Lower Colorado Region

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Conservation Implementation Strategy
Bard, CA. Imperial County

IRRIGATION IMPROVEMENT PROJECT

NRCS
Natural Resources Conservation Service

Steve Reddy – District Conservationist
2197 4th Avenue, Suite 104
Yuma, AZ 85364

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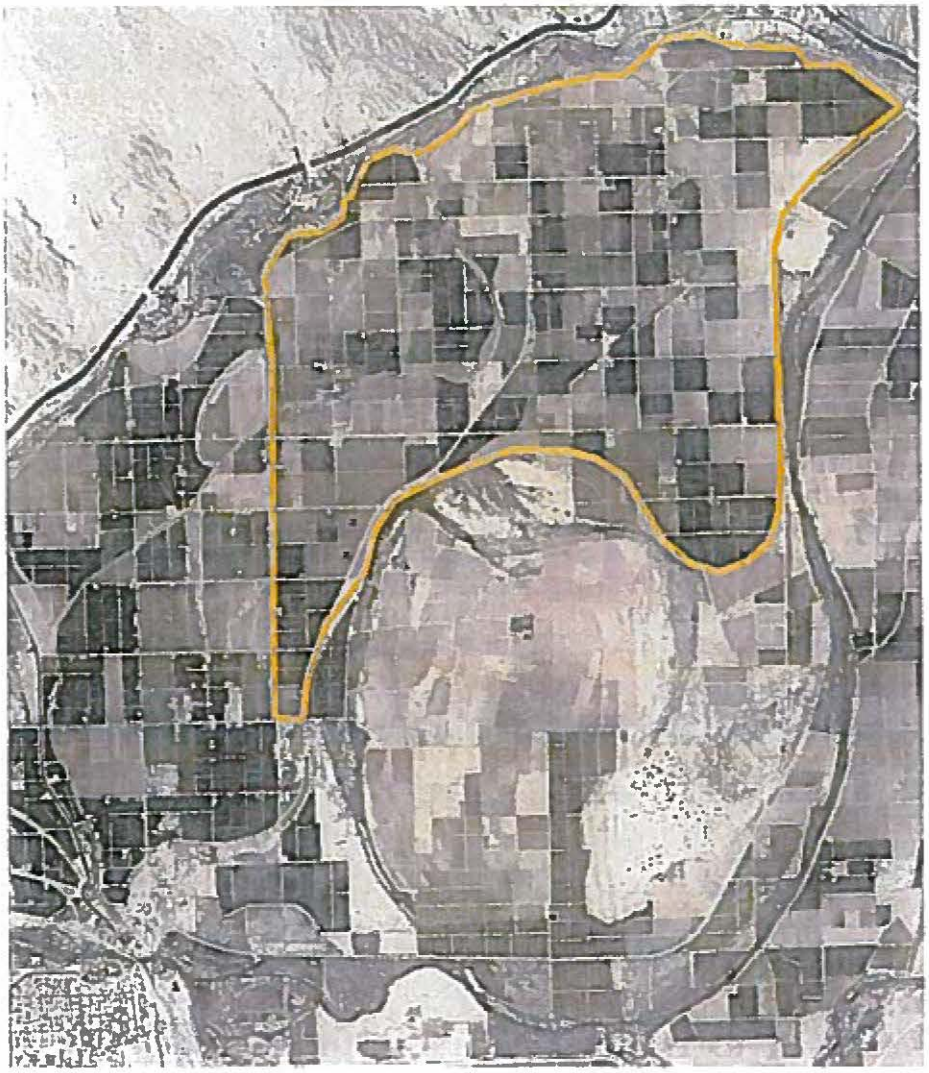
1.5 NRCS Service Center - Yuma

The Yuma NRCS Service Center has an agreement with Imperial County, California to provide conservation services and EQIP contracts to landowners in Bard, CA. The close location and similar land use makes it practical for the Yuma NRCS to provide this service rather than the NRCS office in El Centro, CA.

The Yuma NRCS has experience in Bard and has recently completed a FY16 irrigation project that included 2300 Ft of concrete ditch and 15 large turnouts. Collaboration of the Yuma FSA with El Centro FSA was needed to complete contract eligibility. A FY17 project has been obligated and is now underway. It will include lining of a 777 Ft of earthen ditch and installation of 6 large turnouts.

Image 2. Yellow outline represents approx. 7,120 acres of private farmland in the Bard CIS..



2.0 Resource Concern Statement

The primary resource concern in Bard, CA is 'Inefficient Irrigation' on agricultural land. The condition occurs throughout the area due mainly to old, obsolete irrigation field structures. It is a concern because water demands and projections in the Southwest are constantly being measured and reviewed. Growers and Districts know they must use their Colorado River water resources even more efficiently as demands for reduced river volume increase from all sectors.

Inefficient irrigation in this area means more water is being applied than needed, resulting in more water percolating to the high water table in Bard. This excess irrigation adds to the drainage issues that have been a chronic problem for this area. Also, inefficient irrigation adds stress on the irrigation district's ability to deliver water and to maintain its infrastructure.

3.0 Goal Statement

The overall goal is to improve the irrigation water use efficiency and agricultural productivity of priority fields in Bard. The benefits will include water savings, reduced impact on high water table, reduced demand on Water District, and improved management of winter crops.

The project goal is to install these practices on 6-7 high priority fields annually over the next three years. A total of 18-21 fields will be improved using new irrigation infrastructure and management practices for the lifetime of the practices.

The inefficient use of water is the result of old, undersized, and obsolete field irrigation infrastructure. The inefficiency is magnified in some cases by underdeveloped Water District delivery ditches and structures that limit water volume availability to growers.
Both private land owners (and lessees) and the Water District desire to improve efficiency. Irrigation efficiencies can be achieved by:

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

Early observations indicate there are several fields that would benefit from shortened irrigation lengths or more strategically located irrigation structures. To compliment infrastructure improvements, Irrigation Water Management practices would be implemented to guide land users in efficient use of the new system components.

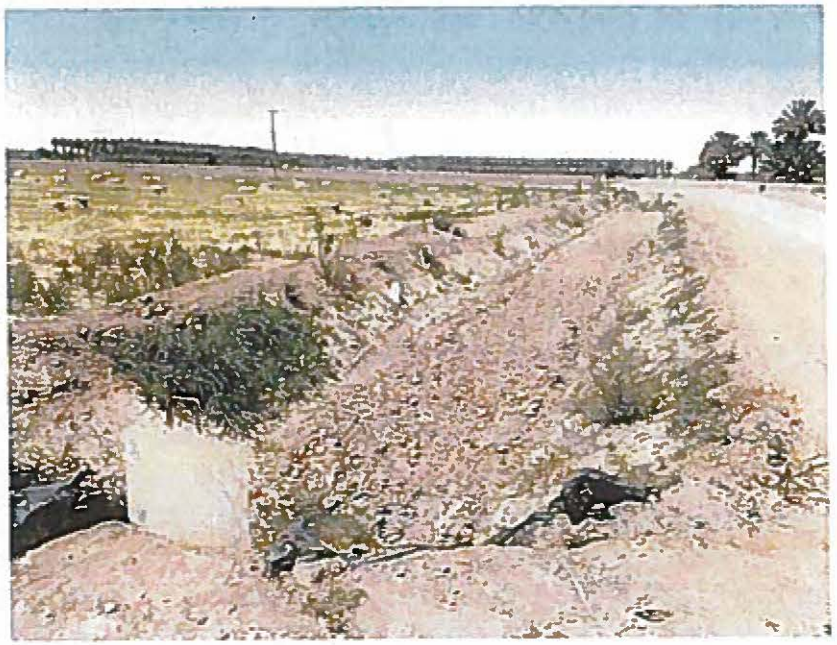
4.0 Purpose of Proposed Strategy

4.1 Infrastructure Efficiency and Management

The purpose of this Bard CIS is to raise the irrigation efficiency of agricultural fields through infrastructure improvements and irrigation management practices. New infrastructure would allow use of larger hydraulic 'heads' of water. Experience has shown that larger 'heads' of water provide both quicker distribution across a field and result in more uniform infiltration, with minimal deep percolation losses.

Many of the existing irrigation structures in Bard are either earthen ditches (image 1) or old undersized concrete ditches utilizing metal slide 'ports' for water distribution to individual sets. Many of these concrete ditches are 50-60 years old, are deteriorated, and use labor intensive distribution controls (Image 2). Water loss through earthen structures and deteriorated concrete structures can be substantial according to a Rio Grande District study (4). The Bard Water District referred to water savings estimates from this study to support a 2003 proposal for canal renovation and relining projects (5).

Image 1. Bard, CA. Example of earthen irrigation ditch.



There are several earthen field ditches that use a variety of distribution ports placed in the embankment (image 3). Generally, earthen irrigation ditches are less efficient, allow excessive seepage loss, and require substantial maintenance for weed control. With a transition to high intensity winter crops, growers will be required to improve control and performance of their irrigation systems. Also, as winter crop acreage expands, food safety requirements will become more important. These requirements strongly discourage wet, muddy conditions, and standing water, all conditions commonly associated with earthen ditches.

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Image 2. Bard, CA. Example of deterorated concrete field ditch with slide ports.

Image 3. Bard, CA. Example of distribution port in collapsed earthen embankment.

4.2 High Water Table

Growers in Bard have mentioned chronic issues with a high water table in the area (6). The high water table is the result of several factors including presence of the Colorado River, seepage from the All American Canal and District canal, and agricultural irrigation. The high water table, and resulting saline soil in some locations, has resulted in localized examples of poor plant condition. Installation of field tile drains has been tried with limited improvement.

Improved irrigation efficiencies would help manage the high water table by reducing excessive seepage losses from agricultural fields. A joint study in 1955 by SCS and Bureau of Indian Affairs investigated the Bard area high water table condition with emphasis on drainage recommendations (7). The water table map from this study shows several locations with groundwater "less than 36" from the surface."

A recent Depth to Groundwater Map (2017 Bureau of Reclamation) now shows many of those areas combined into zones labelled: 0-6' depth to groundwater (8). It is not clear to me whether groundwater levels have improved when compared to the 1955 study.

5.0 Alternatives

5.1 No Action Alternative

The No Action alternative would allow the existing irrigation infrastructure to remain in its current poor condition and performance level. Inefficient irrigation would continue across a variety of crop rotations. Excessive water loss through seepage would continue to contribute to the high water table, worsening the potential for saline soil and poor crop growth.

5.2 Alternative 1

Alternative 1 would primarily be Concrete lining of earthen ditches and relining of old, obsolete concrete-lined ditches under the EQIP program. Irrigation distribution efficiencies could be improved from 10 to 30% as measured by Win-SRFR analysis. Drip irrigation is also a possibility on existing date groves (Date growers have inquired about drip irrigation but no planning has yet been completed).

Because new irrigation structures will be installed, basic Irrigation Water Management will be required on the project acres. Basic IWM would provide guidance to growers on frequency and duration of irrigation events. NRCS would also encourage use of Advanced IWM technology where practical and appropriate. Installation of drip irrigation would be complimented by soil moisture sensors. The Yuma Field Office could demonstrate use of field moisture sensors and suggest situations where the equipment would be most useful.

5.3 Alternative 2

Application of Advanced Irrigation Water Management using soil moisture sensors, data loggers, and data relay equipment. Use of this technology will improve the information growers have on soil moisture throughout their crop soil profile. This information can improve irrigation efficiency by helping growers know actual water content at various soil depths. For this technology to be used effectively on a widespread basis, it is recommended that instruction and field demonstrations be held by NRCS and the equipment company. In the end, any

improvements through use of Advanced IWM will be limited by the performance of the existing irrigation infrastructure.

5.4 Preferred Alternative and Proposed Actions

Alternative 1 is the preferred choice because it directly addresses the problem of inefficient irrigation caused by limitations and deficiencies in existing field infrastructure. In addition, Basic Irrigation Water Management would help growers use the new and larger infrastructure as designed. Ideally, some growers would also select Advanced Irrigation Water Management which would provide even more improvements in water use. Ultimately, it is the ability of growers to apply a larger 'hydraulic head' of water rapidly and uniformly across fields that will result in most irrigation efficiency improvements.

6.0 Environmental Evaluation

6.1 Cultural Resources

The Bard, CA area has been in agricultural production since the early 1900s. Many of the irrigation structures, including both earthen and concrete ditches are old enough to be classified as cultural resources. In addition, CCC (Civilian Conservation Corps) structures from the 1930s are present and, in many cases, still in use. The Bard Water District has encountered historic CCC structures in past renovation efforts and apparently has some procedure for documenting them. Regardless of existing procedures in Bard, a conversation with the NRCS archaeologist indicates that each historic item encountered would have to be documented and reviewed by Arizona NRCS. Consequently, any irrigation ditch improvements in Bard will occur only after Arizona NRCS cultural resources processes have been followed.

Yuma NRCS will gather additional information on cultural resources procedures used in Bard and report them to AZ NRCS for potential streamlining of effort. The fields designated for this CIS are all privately owned with no projects on State leased land or on Reservation land.

6.2 Endangered Species

Earthen drainage ditches exist in the Bard area to remove excess ground water and return it to the Colorado River. These earthen drains provide conditions for wetland vegetation (cattails, etc.) to flourish, and in turn, provide habitat for endangered wildlife (Ridgeway's Rail, Yellow Billed Cuckoo). Because this suitable habitat exists, the Bard Water District has difficulty every year getting permission from wildlife agencies before cleaning and performing other necessary drain maintenance (9). However, the USF&WS National Wetlands Inventory map did not show the drainage ditches to be considered wetlands. On the other hand, areas surrounding Bard, especially near Haughtelin Lake, are indicated as wetlands.

The USF&WS IPAC tool (Information for Planning and Consultation) was used to find locations of potential endangered species. A large area in the center of the Bard project area, containing

7.0 Partnerships and other Funding Sources

The primary partnership will be between private land owners (or lessees) and NRCS through the Environmental Quality Incentives Program (EQIP). The NRCS will make the appropriate reimbursement for practice installation (typically 75% reimbursement of final costs) while the land user would contribute the balance.

The Bard Water District will contribute to general water use efficiency through continued replacement and upgrade of its distribution structures. Should a land user request a relocated turnout based on an NRCS design, the user may have to pay the Water District for that relocation construction cost.

The Bard Water District has undertaken upgrades of its delivery system (particularly the Reservation Main Canal) in recent years (2003-06). The District is currently considering additional planned renovations through collaboration with the Bureau of Reclamation. A joint meeting between Bard Water District, BOR, and NRCS (6/28/17) explored the possibility of the District pursuing Regional Conservation Planning Program (RCPP) funding beginning in 2018. Should a RCPP be successful, the remaining portions of this NRCS Strategy would become part of that effort.

8.0 Implementation

8.1 Client/Field Numbers

I have met with three large agricultural companies that operate in the Bard area. They have given me potential project fields controlled by owners or lessees. Approximately 21 fields have been identified as priorities for irrigation efficiency improvements. The fields have been averaged over the three year CIS lifespan to allow for a workload of seven projects per year. The actual order of these projects will depend on the ranking scores, application submittal, and the complexity of the eligibility process for applicants. An estimate of project acres, conservation practices, and EQIP payments are shown in the attached table (table 1).

The EQIP costs shown include Irrigation Water Management, but only at the Basic Level. The drip irrigation field (owner suggests three stages) would include a pumping plant and advanced Irrigation Water Management as well as sensors and data logger. The EQIP total costs is approximately $741,000. There is the possibility of additional practices being added to a contract, such as cover crop, land leveling, or water measuring device, that could easily increase total cost. For that reason the requested budget for this CIS is $800,000.

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