WaterSMART: Water and Energy Efficiency Grants for FY 2018 – Funding Group 1

Cameron County Irrigation District No. 2

Slip Gate Upgrades on Canals "J", "8", "C", "15", and "LI-1"

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Table of Contents

List of Figures

List of Tables

List of Appendices

Technical Proposal

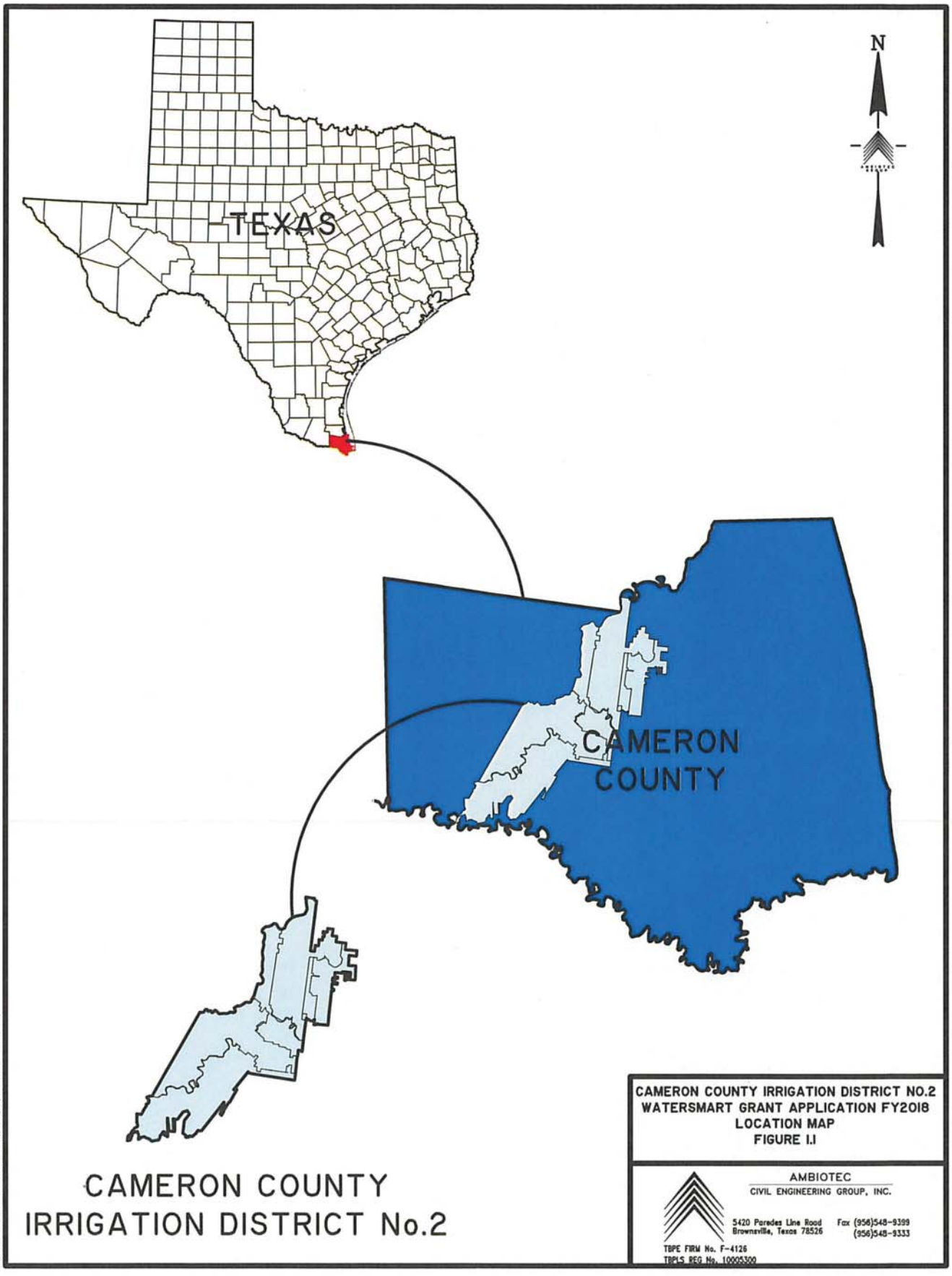
Executive Summary

Date: May, 10, 2018
Applicant: Cameron County Irrigation District No. 2
26041 FM 510
San Benito, Texas 78586
Project Title: Slip Gate Upgrades on Canals "J", "8", "C", "15", and "LI-1"

The Cameron County Irrigation District No. 2 (CCID2) is proposing to partner with the Bureau of Reclamation (Reclamation) for a Funding Group I Project to conserve water and energy. The proposed project consists of installing 5 automated slip gates on 5 different canals throughout the irrigation system. The gates will be solar powered and will connect to CCID2's SCADA system so they can be remotely operated. The existing gates are manually operated and made from wooden boards that leak significant amounts of water. In some cases, the wooden boards and supporting structure have deteriorated to the point where they have been washed out and are no longer present. Additionally, when there are bank failures along the canals, which happen at a rate of around 3 times per year per canal, the wooden boards are unable to hold back the water resulting in significant water loss. These improvements are expected to improve water deliveries by conserving over 2,050 acre feet per year of water. The conserved water is less water that will need to be pumped from the Rio Grande thus improving the reliability of the water supply for all users in the region. The resulting water conservation will reduce required pumping time needed to achieve the same water volume delivery thus increasing energy efficiency of the water delivery system by an estimated 82,500 kilowatt hours per year. The project is consistent with the established priorities of the Department of the Interior in that it utilizes science and best practices for managing land and water resources, modernizes existing infrastructure and greatly reduces maintenance demands. All of the proposed improvements are to be constructed on CCID2 property (none of the improvements will be located on a Federal Facility) and this project will be completed within 24 months. The construction phase of this project is estimated at 6 months, not considering schedule adjustments to accommodate necessary irrigation demands. The project can begin immediately upon execution of any grant agreement.

Background Data

Cameron County Irrigation District No. 2 (CCID2) is located in the Lower Rio Grande Valley Region with its main office located in San Benito, Texas (See Figure 1.1). CCID2 boundary encompasses 64,459 acres and currently serves 55,151 acres of irrigated farmland where farmers grow citrus, vegetables, sugar cane, sorghum, corn and hay (See Figure 1.2).



CAMERON COUNTY IRRIGATION DISTRICT NO.2
WATERSMART GRANT APPLICATION FY2018
LOCATION MAP
FIGURE I.1

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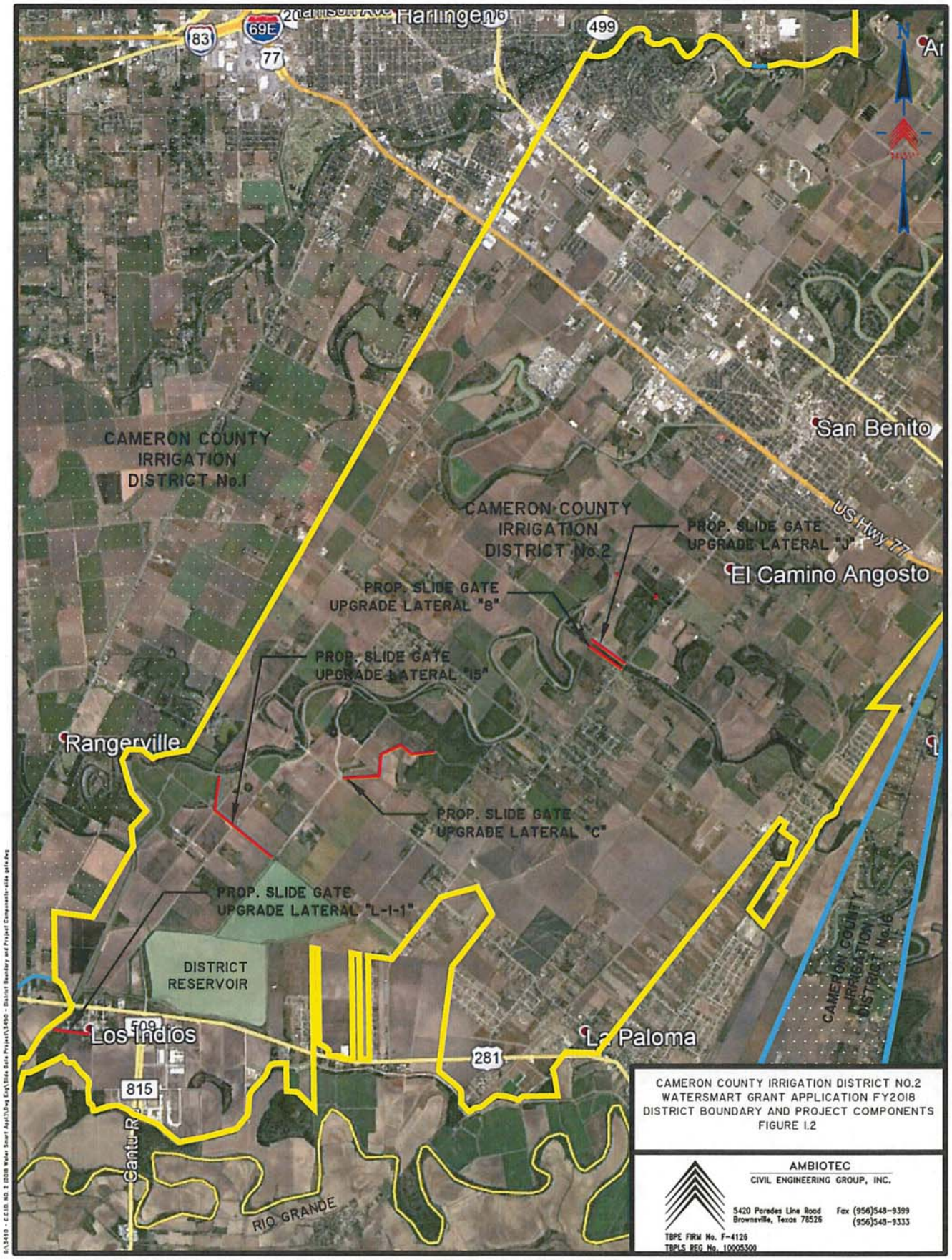

CAMERON COUNTY IRRIGATION DISTRICT NO.2
WATERSMART GRANT APPLICATION FY2018
DISTRICT BOUNDARY AND PROJECT COMPONENTS
FIGURE I.2

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CCID2 receives its water from the District's San Benito River Pump Station located in Los Indios, Texas on the eastern side of the Rio Grande. Pumped water from the Rio Grande is transported via two main earthen canals that deliver the entire district's agricultural and domestic demand. The district's distribution system consists of 241 miles of canals and pipelines including: 120 miles of unlined canals, 17 miles of lined canals, 104 miles of pipeline, and 15 miles of resaca (oxbow lake). Of the 241 miles of canals, 137 miles are considered to be main canals and 104 miles are classified as lateral canals. In addition to the above list of open canals and pipelines, CCID2 has a storage reservoir with a capacity of 7,925 acre feet near the San Benito River Pump Station. Due to the large lengths of inefficient open unlined canals, CCID2's overall distribution conveyance efficiency is an estimated 60 percent.

All water right holders along the Rio Grande below Amistad Dam are part of the Lower Rio Grande Valley Watermaster System. The system is currently over allocated and during the past few decades the semi-arid watershed has experienced several long term droughts. In addition, the supply is further compromised by 1944 US-Mexico Treaty which allows Mexico to detain upstream flows and defer water deliveries up to five years in the amount 350,000 acre feet per year. The result is a system vulnerable to extreme drought and other inconsistent weather patterns.

The Lower Rio Grande Valley Watermaster System provides water to irrigation water right holders after municipal and industrial water right holders have been accounted for. The US share of storage in the Amistad-Falcon System is currently at 61.4% of its 3,390,000 acre feet conservation capacity. This is slightly lower from 62.9 percent of normal conservation capacity a year ago at this time. However, inconsistent weather patterns can't be relied upon as a constant water source plus the area's population continues to grow, so water conservation improvements are crucial to long term water resource management.

Currently, CCID2's irrigation water right is a total of 147,824 acre feet per year. In addition to their irrigation water rights, the CCID2 holds municipal/domestic water rights of 5,518 acre feet per year, municipal water rights of 6,390 acre feet per year, and industrial water rights 192 acre feet per year. The average annual water diverted by the CCID2 from 2011 through 2017 for all users was roughly 79,400 acre feet per year. The CCID2's primary municipal customers include the East Rio Hondo Water Supply Corporation (6,685 acre feet per year), City of San Benito (5,500 acre feet per year) and the City of Rio Hondo (890 acre feet per year). The CCID2 is the sole source of water for these municipalities, which together include a total population of nearly 50,000 residents.

The CCID2 obtains its water from the Rio Grande at the CCID2 San Benito River Pump Station. This pump station, constructed in 2005, includes eight pumps (2 – 150Hp, 50 cfs pumps and 6 – 300Hp, 100cfs pumps) and is powered by both electricity and natural gas.

The CCID2 has completed several projects with Bureau of Reclamation in the past, including:

1. Pumping Plant Rehabilitation (03-FC-60-1799)
2. Canal Rehabilitation (04-FC-60-1871)
3. Water 2025 Challenge Grant- Gate Replacement (05-FC-60-2017)
4. Water 2025 Challenge Grant- Canal Piping (07FC602235)
5. Water 2025 Challenge Grant- Canal Flow Measurement & Control Improvements (08-FC-60-2330)
6. 2016 WaterSMART Grant - Lateral "J" Open Channel to Pipeline (R16-FOA-DO-004)
7. 2017 WaterSMART Grant – Lateral "JN-1" Open Channel to Pipeline (R17AP00141)
8. 2017 WaterSMART Grant – Lateral "8" Open Channel to Pipeline – Under Construction (R17AP00138)
9. 2017 WaterSMART Grant – Lateral-"F" Open Channel to Pipeline – Under Design (R17AP00140)
10. 2017 WaterSMART Grant – Canal "E" Open Channel to Pipeline – Under Design (R17AP00139)
11. CCID2 is also a member of the Rio Grande Regional Water Authority that participated in the "Lower Rio Grande Basin Study", prepared by the Bureau of Reclamation in 2013.

Through CCID2's financial partnership with the Bureau of Reclamation, the above projects are conserving roughly 45,460 acre feet of water per year (upon completion of all projects).

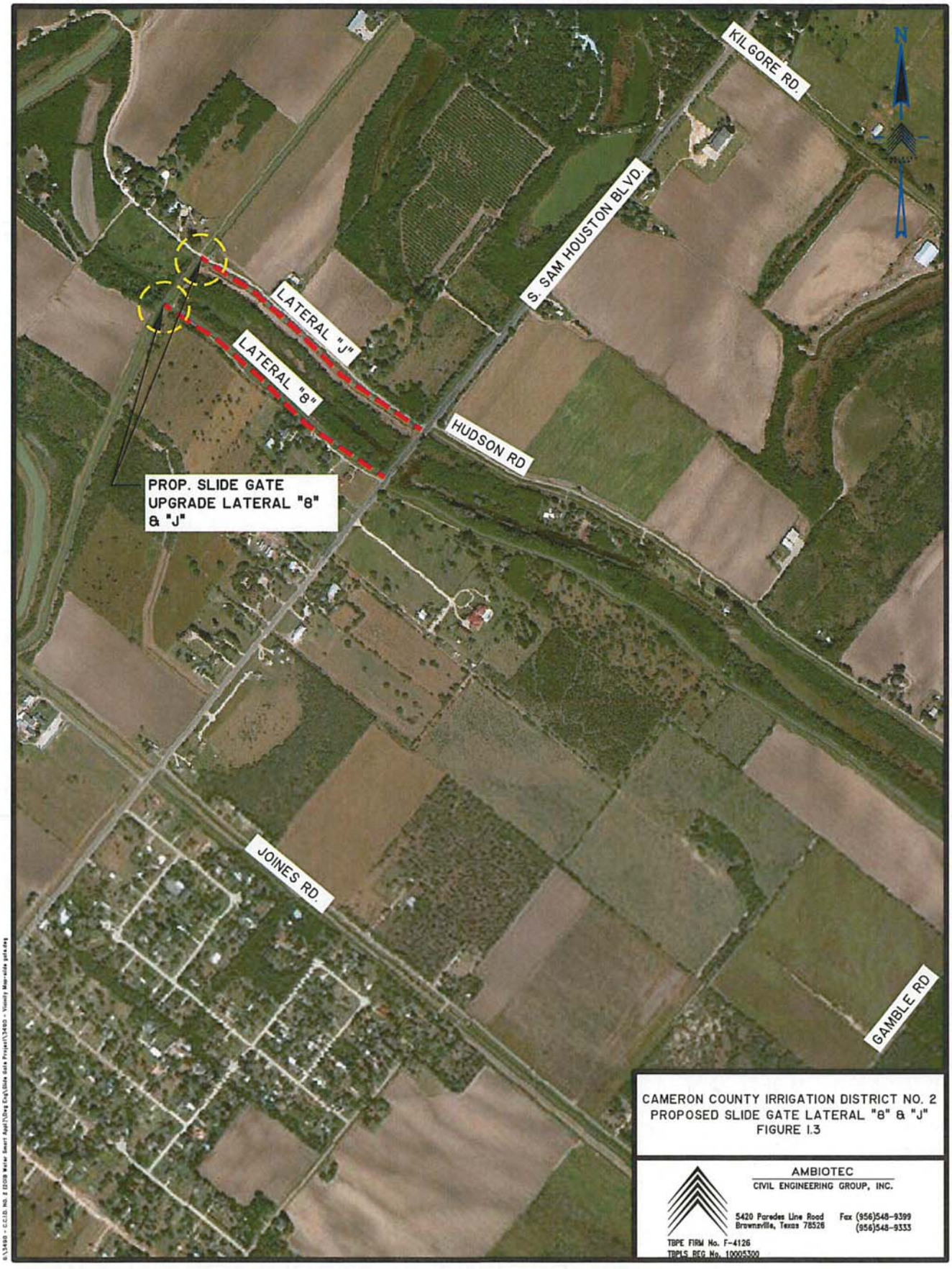
Project Location

The Slip Gate Upgrades on Canals "J", "8", "C", "15", and "LI-1" project is located in Cameron County, Texas near San Benito. The location of the five (5) gates may be viewed in Figure 1.3. The approximate coordinates of each of the 5 gate locations are as follows:

- Canal "J": 26°6'8.60"N Latitude; 97°39'57.05" W Longitude
- Canal "8": 26°6'7.05"N Latitude; 97°39'59.00" W Longitude
- Canal "C": 26°5'1.61"N Latitude; 97°42'18.90" W Longitude
- Canal "15": 26°4'22.45"N Latitude; 97°42'57.19" W Longitude
- Canal "LI-1": 26°2'56.79"N Latitude; 97°45'1.38" W Longitude

Project Description

The project consists of water savings, water supply reliability, and other components that meet the goals of the 2018 WaterSMART Funding Opportunity Announcement No. BOR-DO-18-F006. The proposed project includes installing five (5) automated slip gates along key inflow points along five different canals. The location of the five gates is depicted in Figure 1.3. The five locations included in this project currently house gates constructed



CAMERON COUNTY IRRIGATION DISTRICT NO. 2
PROPOSED SLIDE GATE LATERAL "8" & "J"
FIGURE 1.3

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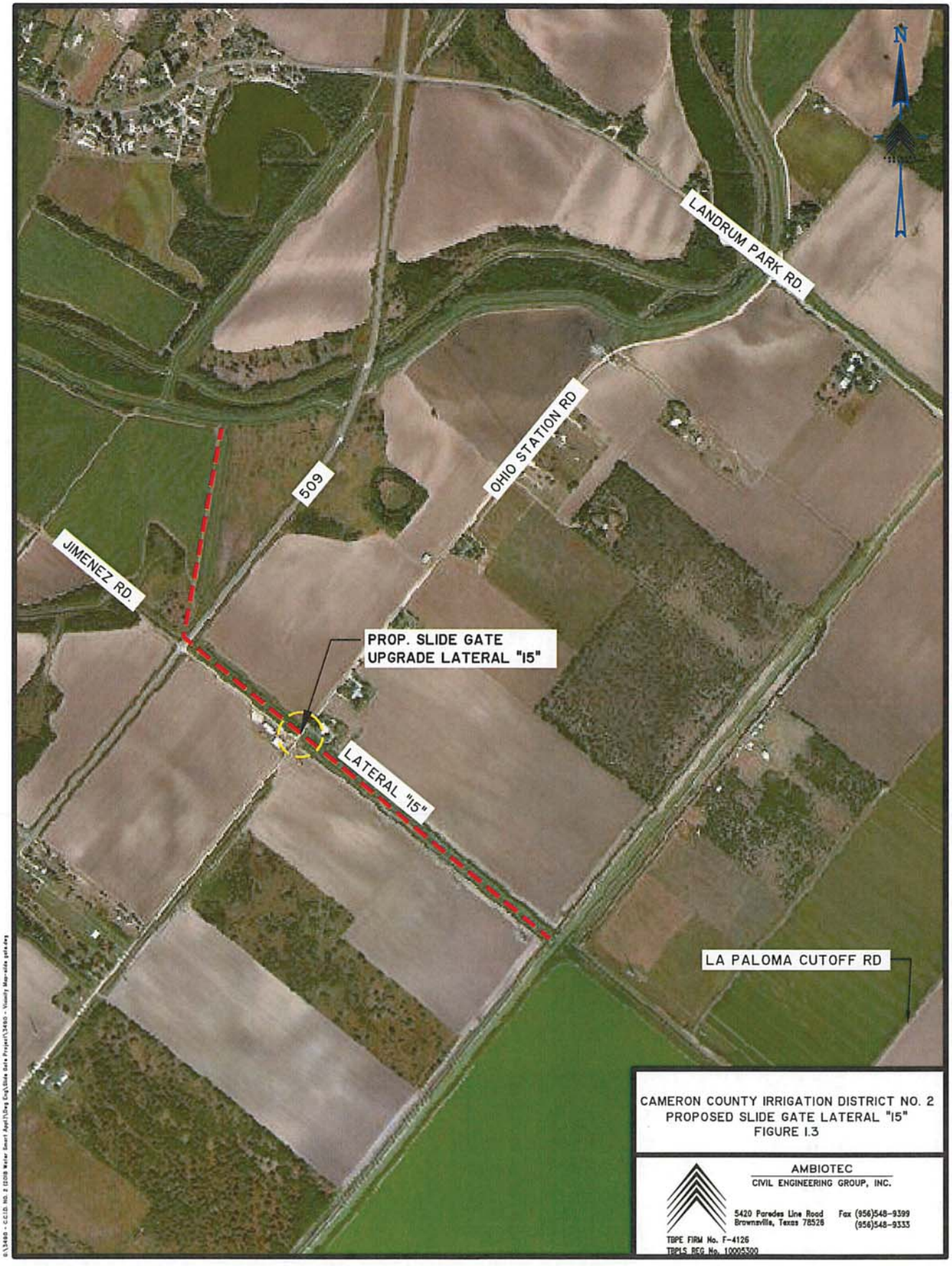

CAMERON COUNTY IRRIGATION DISTRICT NO. 2
PROPOSED SLIDE GATE LATERAL "15"
FIGURE 1.3

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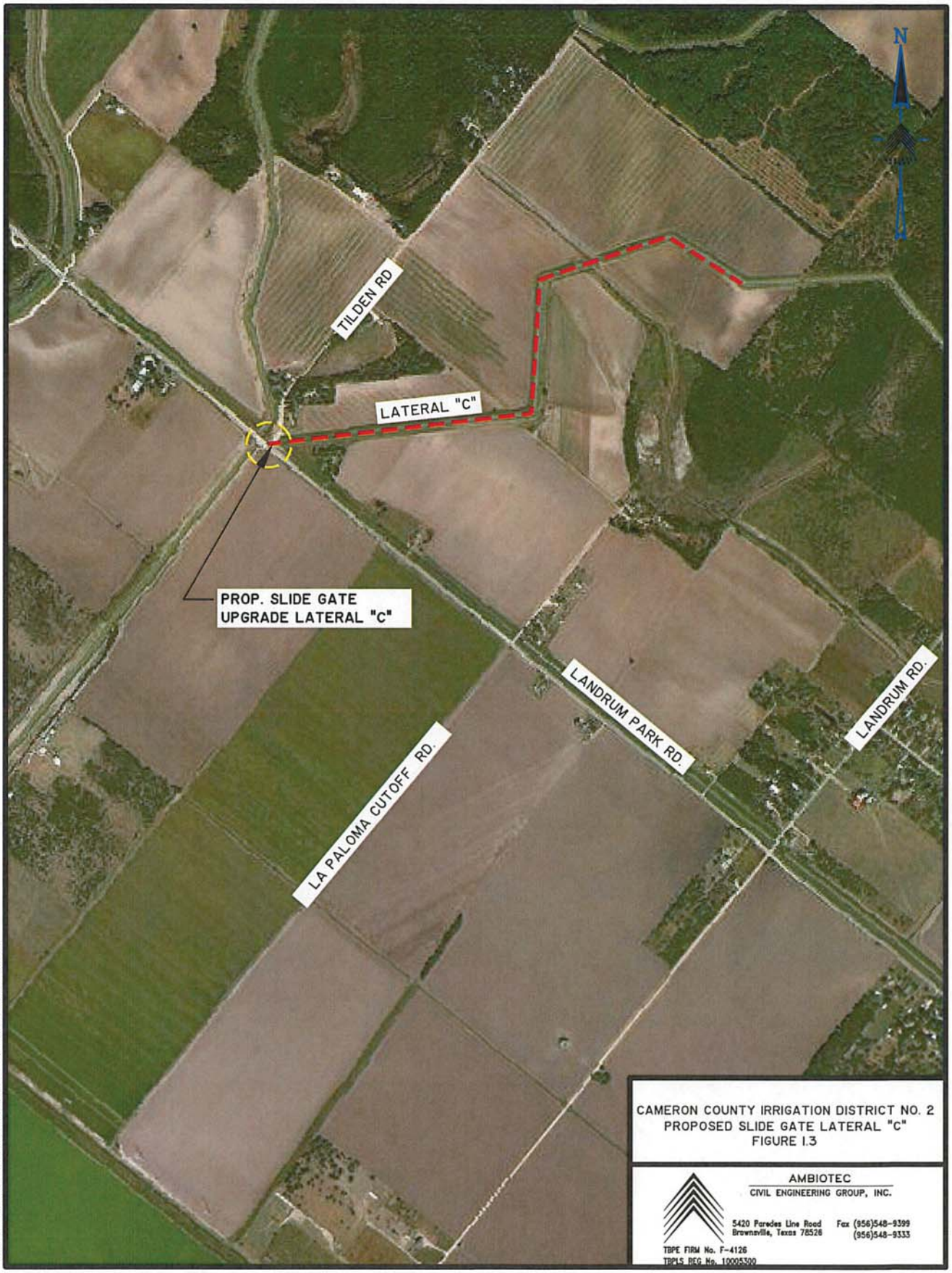

CAMERON COUNTY IRRIGATION DISTRICT NO. 2
PROPOSED SLIDE GATE LATERAL "C"
FIGURE 1.3

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CAMERON COUNTY IRRIGATION DISTRICT NO. 2
PROPOSED SLIDE GATE LATERAL "L-I-1"
FIGURE I.3

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from wooden boards that experience high levels of water loss due to leakage. Additionally, since water levels cannot be adequately controlled by the existing wooden board structures, when bank failures occur (which occur approximately once per year along each canal), all of the water in the ditch is lost plus the water that continues to enter the canal from the upstream segment. The installation of the five gates will conserve an estimated 2050 acre-foot of water per year. Figures 1.4 through 1.6 show pictures of three of the proposed gate installation sites and are typical of all five sites.

E.1 Evaluation Criteria

E.1.1 Evaluation Criterion A - Quantifiable Water Savings

The combined impact of repeated bank failures and the resulting water loss from the five gates equates to approximately 2050 ac-ft annually. By installing automated slip gates (See Appendix A for products information), this project will eliminate nearly all of the water losses that result from the seepage through the wooden boards. An installed sensor will detect when water levels in the canal drop and shut the gate accordingly to prevent additional water loss.

To calculate the volume of water lost during each canal failure, Mannings equation was used to estimate flow in the canal. The equation for Manning's is:

$$Q = (KAR^{(2/3)}S^{(1/2)})/n$$

Where,

K = roughness coefficient
A = Cross-Sectional Area
R = hydraulic radius
S = Slope
n = roughness coefficient, and
Q = flow

Using the above information and the information provided in Table 1 below, the conserved water volume was calculated at approximately 2050 acre feet per year or an annual transit loss reduction of 59.39 acre-feet per mile. The water conservation calculation is shown in Table 1 below.

CAMERON COUNTY IRRIGATION DISTRICT No.2

Figure I.4 - "C"

Figure I.6 - "L-I-1"

Figure I.5 - "I5"

CAMERON COUNTY IRRIGATION DISTRICT NO.2
EXISTING CONDITIONS

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Table 1			
Water Conservation Estimate			
	Value	**Units**	**Note**
K	1.49	for units of f, s	
S	0.001	ft/ft	
n (canal)	0.022		earth, clean
Average Canal Depth	2.5-3	ft	
Canal 8 Cross-Sectional Area (A)	56.3	sq-ft	
Canal 8 Wetted Perimeter (P)	27.08		
Canal 8 Hydraulic Radius (R)	2.08		
Canal 8 Flow (Q)	196.13	cfs	
Canal C Cross-Sectional Area (A)	114.0	sq-ft	
Canal C Wetted Perimeter (P)	43.48		
Canal C Hydraulic Radius (R)	2.62		
Canal C Flow (Q)	464.24	cfs	
Canal 15 Cross-Sectional Area (A)	31.25	sq-ft	
Canal 15 Wetted Perimeter (P)	17.08		
Canal 15 Hydraulic Radius (R)	1.83		
Canal 15 Flow (Q)	100.12	cfs	
Canal LI1 Cross-Sectional Area (A)	100	sq-ft	
Canal LI1 Wetted Perimeter (P)	27.08		
Canal LI1 Hydraulic Radius (R)	3.69		
Canal LI1 Flow (Q)	511.68	cfs	
Total Flow in all Canals	1,272	cfs	
Avg. Time of Water Flow after bank failure	6.5	hrs	
Total Volume lost per bank failure	683.40	ac-ft	
Average # of Bank Failures per canal per year	3		
Total Annual Volume of Water Loss from Bank Failures	**2050.19**	ac-ft	

The proposed gate improvements will better manage the water delivered to hundreds of acres immediately served by each of the five canals plus hundreds of additional acres served by the canals that tie into the improvements.

The CCID2 has pumped an average of 79,400 acre feet annually in recent years. Since majority of the district's distribution system relies on unlined and open earthen canals for

delivery, the water losses in the distribution system are estimated at nearly 40 percent, or final delivery of only 47,640 acre feet per year. When comparing the water savings for the proposed gate improvements, 2050 acre feet, the annual water savings expressed as a percentage of the district's supply is 2.6%.

Upon completion of the proposed improvements, CCID2 will verify the water loss calculations by comparing water volume deliveries before and after the project along each canal segment. The annual average water delivery over the last several years will be calculated along each canal segment and compared to the flows passing through the gate after the project is constructed. While this is not a direct measurement, it will allow for an approximation of the percentage change in water volume deliveries. CCID2 will prepare a final report, for submittal to the Bureau of Reclamation, on the findings of the water conservation measures resulting from the proposed improvements included in this project.

E.1.2 Evaluation Criterion B: Water Supply Reliability

The proposed project improves the reliability of the water supply for our local providers and users. The Lower Rio Grande Valley has been subject to periods of drought on several occasions over the last decade. Additionally, inefficiencies resulting from aged infrastructure combined with high rates of water loss from evaporation, infiltration and bank failures threaten the reliability of the water supply for all users in the region many of which live in rural and economically disadvantaged areas (31% of population is at or below the poverty line). As indicated in Section E.1.1, the proposed project eliminates a loss of nearly 2050 ac-ft of water per year. This is 2050 ac-ft less of water that will need to be pumped from the Rio Grande that will instead be available for other users. The five structures that will be installed as part of this project provide critical upgrades that result in a water savings that will benefit all users through the Lower Rio Grande Valley.

The project has strong support in the region including from the East Rio Hondo Water Supply Corporation (ERHWSC). ERHWSC supports the efforts of the District to conserve water for all and both have provided letters of support (attached). The project helps set an example for other water supply agencies in the region on how both water and money can be saved through the implementation of infrastructure upgrades such as described in this project.

The project will also provide a benefit to threatened and endangered species in the Lower Rio Grande Valley. Specifically, much of the rural portion of Cameron County is prime habitat for both the Ocelot and Jaguarundi and the Department of the Interior has several wildlife areas throughout the County including a USFWS refuge to the east of the project and a designated wetland area immediately south of the project area. Irrigation water is pumped from the Rio Grande, into the natural Resaca network that traverses the County.

These resacas are used by native wildlife, including the Ocelot and Jaguarundi, as a fresh water source for drinking and maintaining riparian habitat, so reducing water losses in the region improves the reliability of water supply not only for residents, but also for critically threatened and endangered wildlife species.

E.1.3. Evaluation Criterion C: Implementing Hydropower

The proposed project does not include the implementation of hydropower.

E.1.4. Evaluation Criterion E: Complementing On-Farm Irrigation Improvements

The canals that will be served by the proposed automated gate installation project serve thousands of acres of land which farmers grow vegetables, sugar cane, sorghum, corn and hay. On-Farm Improvements are controlled by the individual land owners. However, the installation of automated slip gates will increase the water volume and pressure in the canals upstream of the gates to allow landowners to install more efficient localized irrigation, drip irrigation, pumped sprinkler system or lay flat irrigation poly pipe. Additionally, any farmer applying for EQUIP funding off of our proposed projects can enter into an agreement with CCID2 to install their pipelines at no additional cost to them. Under the agreement, CCID2 would contribute the labor and equipment required to install the funded pipeline.

E.1.5. Evaluation Criterion D: Department of the Interior Priorities

The installation of five automated gates utilizes science and best practices for managing land and water resources. First, the installed gates will eliminate significant losses currently experienced by seeping through the wooden boards that are currently in place at the sites. The total combined impact of such losses is currently estimated at approximately 2050 ac-ft annually. Drought conditions have become more prevalent over the last decade and projects like this one that result in reduced water losses are essential to ensuring adequate water supplies for future use.

The project also involves modernization of existing infrastructure, another one of the priorities listed by the Department of the Interior. The project will construct new, automated and solar powered slip gates in lieu of antiquated wooden board structures that are currently used to control water flows through the canals.

Water for the District's canal infrastructure is largely diverted from a natural Resaca system that meanders through the region. Many of these Resaca systems are designated wetland areas and as such are important sources of native habitat in addition to fresh water. As such, any water that can be conserved through the minimization of losses by modernizing infrastructure provides a benefit to designated wetlands and native threatened and endangered species, such as the Ocelot and Jaguarundi that utilize these areas. Further, there are several designated state and federally owned wildlife management areas throughout the District's region that rely on the resacas as freshwater sources for the effective management of vegetation and wildlife on their properties.

E.1.6. Evaluation Criterion F: Implementation and Results

Subcriterion No. F.1 – Project Planning

The installation of the five proposed gates has been identified and prioritized in past District planning efforts. The CCID2 has adopted a Water Conservation Plan and a Drought Contingency Plan (included in Appendix G) to ensure that water is used efficiently within the operations of the district during normal operations and during drought conditions. These plans are developed to address several strategies to decrease the overall water consumption, reducing system water conveyance losses, and improving efficiency of water use. CCID2's staff and operators have first-hand knowledge of the delivery inefficiencies and the structural conditions of the conveyance system. CCID2 identifies this type of project and ranks them based on the most cost effectiveness in regards to water and energy conservation to the district.

Subcriterion No. F.2 – Performance Measures

The installation of the five automated slip gates will allow CCID2 to monitor their water delivery much more accurately than what they are currently able to do. Further, they will be able to minimize water losses that result from canal breaks by remotely closing gates when necessary or by setting gates to automatically close when water levels drop to set levels. While it is difficult to directly measure the impact of the installed project, the change in water loss volume before and after the project will be estimated by comparing average annual water deliveries along each canal over the last several years. While this isn't a direct measurement, approximate percentage change in water volume delivery before and after the project will allow for an indirect measurement of the effectiveness of the project.

E.1.7 Evaluation Criterion H: Nexus to Reclamation Project Activities

The Bureau of Reclamation has funded numerous projects in the Lower Rio Grande Valley for several irrigation and municipal entities. All the projects directly and indirectly affect

water conservation for the entire basin which transfers to benefits to all users in the Lower Rio Grande Valley Watermaster System. CCID2 experience with previously funded Bureau of Reclamation projects are listed in Background Data Section of this report.

The Lower Rio Grande Basin Study was completed by the Bureau of Reclamation in December, 2013. The report was completed in partnership with the Rio Grande Regional Water Authority, including its 53 entity committee, the TCEQ Region M Planning Group, the Texas Commission on Environmental Quality, the Texas Water Development Board, and the International Boundary and Water Commission. The study evaluated future water demands, future water supply, weather inconsistencies and other factors impacting the supply and demand for water in the Lower Rio Grande Basin. The Rio Grande Regional Water Authority is made up of eight counties including Hidalgo, Willacy and Cameron Counties. CCID2 is an active member of the Rio Grande Regional Water Authority.

E.1.8. Evaluation Criterion G: Additional Non-Federal Funding

CCID2 is seeking federal grant funds of $164,766 and the remaining funds for the project will be provided by CCID2. With a total project cost of $366,148, the Non-Federal funding percentage is 55 percent.

Table 2

Summary of Non-Federal Funding Sources

Funding Sources	Funding Amounts
Non-Federal Entities	
Cameron County Irrigation District No. 2	$201,381
Non-Federal Subtotal:	**$201,381**
Other Federal Entities	
None	$0
Other Federal Subtotal:	$0
Requested Reclamation Funding:	**$164,766**
TOTAL PROJECT FUNDING:	**$366,148**

Project Budget

Funding Plan and Letters of Commitment

CCID2 will fund the entire non-grant portion of this project, $201,381 or 55-percent of the project costs. No 3rd Party funds will be used on this project. CCID2 portion of the funds include $59,149 of in-kind contributions including labor and equipment costs. CCID2

cost associated with material and contractual costs will be compensated through the District's account reserve funds. Labor and equipment in-kind services will be paid for from the District's general operating budget. The District's accounting balance sheet (included in the Appendix J) shows that sufficient funds are available for the completion of this project. Table 2 above shows the Summary of Non-Federal Funding Sources.

Budget Proposal

Table 3 shows the Project Budget Proposal.

Budget Narrative

Salaries and Wages

The District personnel involved in this project along with their salaries and fringe costs are detailed in Table 3. The General Manager, Mrs. Sonia Lambert, has been District Manager for forty years. CCID2 has completed several Bureau of Reclamation improvement projects under the management of Mrs. Lambert. The Field Supervisor for the proposed work will be Mr. Jesse Moncivaiz. Mr. Moncivaiz has 15 years of experience as a field supervisor and has been with CCID2 for 23 years.

The District also plans to utilize two construction crews made up of 3 men. Both crews are able to complete the work needed for this project. The fringe benefits of 14.48%, as shown in Table 3, include Social Security, Retirement, Health Insurance, Paid Leave, Medicare, Unemployment and Workers Compensation.

The project budget assumes two crews for seven and a half, 40 hour work-weeks to construct the proposed improvements.

The construction time for two crews is budgeted at seven and a half, 40 hour work-weeks or 300 hours and the Field Supervisor time is estimated at 36 hours per week during construction and an additional 60 hours for the managing of in-kind services provided by the district. The General Manager's (Sonia Lambert) time is budgeted at 80 hours for the length of the project to manage all phases of the project.

Fringe Benefits

The fringe benefits of 14.48%, as shown in Table 3, include Social Security, Retirement, Health Insurance, Paid Leave, Medicare, Unemployment and Workers Compensation.

Travel

There is no travel anticipated on this project.

Equipment

CCID2 plans on using two pieces of equipment included in Table 3, a D6 Bulldozer and JD 290 Excavator, already owned and maintained by the district. Equipment rates are based on the "Construction Equipment Ownership and Operating Expenses Schedule, Region VI" by the US Army Corps of Engineers, November 2011.

The JD 290 excavator is estimated to be operating about 80% - 90% of the 300 hours budgeted and be on standby the other 10 - 20% of the time. For the 40 hours budgeted for the D6 Bulldozer, it is estimated to be operating 90% of the time and be on standby 10% of the time. Additionally, a backhoe, on standby, has been budgeted at 300 hours.

Materials and Supplies

The unit pricing for the motorized gates, SCADA Communication & Controls, and Equipment Framing & Mounting are based off of previous project experience and price quotes from Trac-N-Trol of $12,500 each, $30,000 each, and $1,500 each respectively. The unit prices for ready-mix concrete ($105/cubic yard), rebar ($500/per installation) and other ancillary materials and equipment were based off of previous experience and estimates provided by CAPA.

Contractual

Professional Services - Ambiotec Civil Engineering Group, LLC (Ambiotec) will provide surveying and engineering services to construct the project. Services include surveying the gate site for field topography, designing engineering construction plans and specifications to retrofit the existing structures with the proposed slip gates and ancillary equipment, and assistance throughout construction. The Engineer will also assist with the request for proposals for material quotations. The total estimated cost for this contractual portion of the project is approximately $56,500 for surveying and engineering services.

Material Supplies - CCID2 is a public entity operating under the Texas Water Code and subject to those procurement standards for construction proposals and materials over $25,000. It is assumed that three sets of materials quotations will be required. For contracts over $75,000, the public bidding process will be required which includes two

public advertisements in a general circulated newspaper. It is assumed that two public request for bidders will be required to provide bids.

Environmental and Regulatory Compliance Costs

The District has included in its budget a flat rate of $2,000 for Environmental and Regulatory Compliance. While the amount of work that may be necessary for environmental clearance is difficult to predict and will be determined by initial notification of the regulatory agencies, previous experience working at similar sites supports the estimated rate of $2,000. Notification and required report costs are included in the $2,000.

Other Expenses

The anticipated project reporting costs are estimated at $3,000 which includes evaluation of metered flow to verify and document the water savings.

Indirect Costs

There are no anticipated indirect costs on this project.

Environmental and Cultural Resources Compliance

The proposed project will be constructed by CCID2 staff. Staff will be instructed to minimize impacts to local environmental sensitive areas and adjacent landowners. All proposed improvements are to be constructed with in the CCID2 existing right-of-way (ROW) which has been previously disturbed. To protect against any environmental damages, CCID2 will coordinate with Federal, State and Local regulatory agencies to ensure all required environmental regulations are followed. Below are the responses to the ten (10) questions presented in Section D.2.2.6 of the Funding Opportunity Announcement No. BOR-DO-18-F006

1. Since the project will include soil excavation, the creation of dust is a strong possibility. CCID2 crews will sprinkle water to control dust creation during construction.
2. All irrigation canals and proposed gate upgrade sites are routinely maintained by CCID2 maintenance crews and don't provide sufficient habitat for endangered species. The area is not designated as a protected habitat by the US Fish and Wildlife Service. In any case, CCID2 will work with all Federal, State and Local

regulatory agencies to ensure the project follows any required federal environmental regulations.

3. There are no wetlands or surface waters that fall under CWA jurisdiction within the project boundaries. The Corps of Engineers does not regulate irrigation canals and drainage ditches.
4. Portions of the CCID2 water conveyance system was constructed 1903.
5. The project proposes will upgrade five gate structures to better manage water throughout the system and minimize water loss that results from leakage through the existing wooden boards and bank failures. These features were constructed, modified and improved on an as-needed basis over the last 60 years.
6. CCID2 doesn't own any structures that may qualify for the National Register of Historic Places. The Environmental Compliance Report will coordinate with the Texas State Historical Preservation Office for approval prior to the commencement of the construction work.
7. There are no known archaeological sites in the project area. The Environmental Compliance Report will coordinate with the Texas State Historical Preservation Office and other applicable review agencies for approval prior to the commencement of the construction work.
8. This project will have indirect positive effect on low income or minority populations. The proposed project will conserve water and energy required to provide irrigation water throughout the system. This results in a cost savings for the CCID2 and the public of which 32 percent is at or below the poverty rate
9. There are no tribal lands in the project area.
10. The project will not contribute to the continued existence or spread of noxious weeds or non-native species.

Required Permits and Approvals

The Environmental Compliance Report will coordinate with and obtain approvals from multiple Federal and State environmental agencies prior to the beginning of the construction phase of this project. No permits are anticipated to be required, but any requested permit coming from the Environmental Compliance document will obtain approval prior to the beginning of construction. The project does not include the crossing of any TxDOT or Cameron County right-of-ways thus will not require any utility crossing permits.

Letters of Project Support

See Appendix H for the letter of support from East Rio Hondo Water Supply Corporation and the Rio Grande Regional Water Authority.

Official Resolution

CCID2 adopted a resolution for this Grant Application on May 9, 2018. A copy of the Resolution is included in Appendix G.

Unique Entity Identifier and System for Award Management

CCID2 is registered in the System for Award Management (SAM) and its unique entity identifier is: 048459937 / 6J2J5

CCID2 will maintain an active SAM registration with current information at all times during which it has an active Federal award or application plan under consideration by a Federal awarding agency.

List of Appendices

Appendix A
Rubicon Data Sheet

SlipGate®

RUBICON™

Overview

The SlipGate is a new generation of precision sluice or slide gate with an all-in-one design that makes remote automated control as simple as installation.

All-in-one means everything has been designed – drive system, motor control, power supply, local control keypad and telemetry – to function as one single unit. There are no integration problems or incompatibilities, it simply works.

Designed from the ground up with technological innovations, the SlipGate provides precision and reliability even under the high-duty cycles that are a consequence of automation. The patented drive system, laminated panel and unique adjustable seals remove the risk and ongoing maintenance issues associated with trying to automate existing gates.

To enable installation in those remote sites that are most costly to visit, the SlipGate is powered with a high performance solar power system. And that also means you can avoid the electricity costs often associated with automation.

In-built support for the most common SCADA software protocols and a variety of radio or GPRS options provide flexibility without compromising design integrity and reliability.

Automatic control

The SlipGate is designed to easily integrate a third-party level sensor or flow meter or Rubicon's own standalone MicronLevel® water level sensor mounted nearby. The built-in software provides seamless SCADA management of the integrated meter or sensor and the following control possibilities.

Water level control	When interfaced with a water level sensor, the SlipGate software will collect data from the water level sensor and modulate the gate to maintain a desired level in the pool immediately upstream or downstream, depending on the water level sensor location.
Flow control	When interfaced with a flow meter, the SlipGate software will collect data from the flow meter and modulate the gate to maintain a desired flow rate.

A TCC® product

The SlipGate is one of the products making up a modular family of precision hardware and software called TCC (Total Channel Control®). TCC is an advanced technology set designed to improve the management and productivity of water in open channel and gravity pipeline distribution. Unlike traditional infrastructure, TCC products can interact and work together to help managers improve:

- the availability of water
- service and equity to users
- management and control
- health and safety for channel operators

Features

- Sophisticated control software
- Integrates with a level sensor or flow meter
- SCADA ready communication system
- Solar-charged or AC charged battery system
- Not affected by seating or unseating head
- High duty cycle operation

An ideal solution for...

- Sites with large operational head variations
- Sites where level and flow measurement is not needed or already exists
- Automating farm service points
- Gates used to evacuate channels in stormwater situations
- Remote locations without AC power

Data Sheet

SlipGate®

Local Control pedestal

Each SlipGate installation includes a robust pedestal that provides power and control to the gate and is a secure, weather proof housing for electronic components and batteries.

The pedestal also serves as a local user interface. A keypad and LCD display are located under the pedestal lid, allowing farmers to monitor, or operators to control and troubleshoot on-site.

High strength construction

FormiPanel™ is Rubicon's high strength construction method that uses techniques adopted from the aerospace and marine industries.

The gate panel assembly is made from a laminate construction that utilises high strength industrial adhesives to bond structural grade aluminium extrusions and skin plates to a synthetic core material. The result is strong, lightweight, and corrosion resistant.

Gate control technology

CableDrive™ is Rubicon's actuation system designed to provide precision gate position accuracy and repeatability in harsh environments. The drive is a wire-rope (cable) and drum mechanism that provides positive drive in both the raise and lower directions. It is designed for high duty cycle operation and provides precise gate positioning to within ±0.5mm.

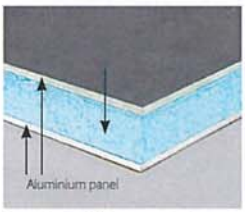
The drive is managed by Rubicon's SolarDrive® technology – a purpose built integrated circuit board that manages gate positioning, solar power regulation, battery charge, fusing and the pedestal keypad interface.

Remote management

The SlipGate can be managed remotely with a third-party SCADA system or Rubicon's SCADAConnect®. With SCADAConnect, authorised users can remotely adjust the SlipGate, view real-time and historical information and configure SMS alerts.

As an alternative to in-house SCADA systems, SCADAConnect can also be deployed as an entry level cloud solution to manage SlipGates over the internet using just a web browser and cellular networks.

Control pedestal



FormiPanel™ construction

SolarDrive® electronics

SCADAConnect® software

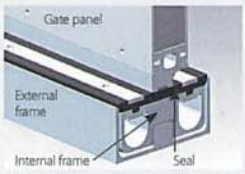
Unique seal technology

Gate seals are fitted on three or four sides of the gate leaf depending upon whether the entire leaf is under water. The seals are continuous and fitted to the internal frame of the SlipGate. They extend along the full perimeter of the outer and underside of the gate panel.

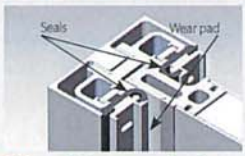
Seals on both the upstream and downstream sides of the gate mean it can hold flow in both directions and is not affected by seating or unseating head.

The crush between the seals and the gate leaf wear pads can be easily adjusted to compensate for wear. The pads are constructed with PVC to reduce the coefficient of friction and increase service life, especially under high duty cycles.

The unique gate leaf profile crushes the bottom seal when the gate is closed to ensure an excellent seal.



Bottom gate seal (cross section)



Side seals (cross section)

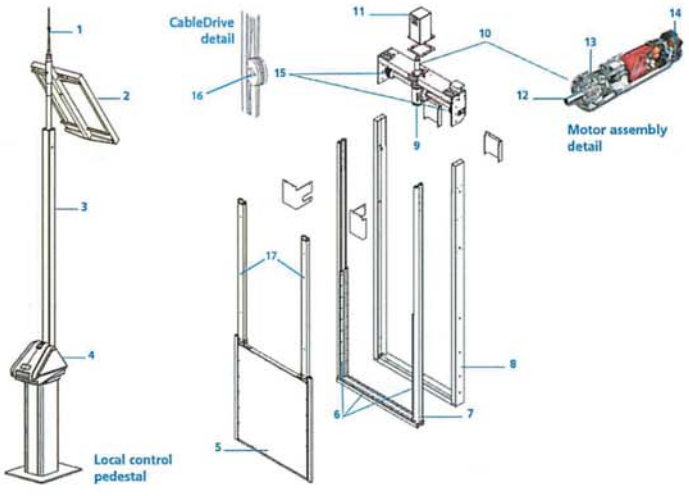
SlipGate® components

Control pedestal

1 Antenna
2 Solar panel
3 Hinged mast
4 Secure controller housing with LCD display

Gate unit

5 Gate panel
6 Gate seals
7 Internal frame
8 External frame
9 Output drive assembly (gear box)
10 Motor and encoder
11 Motor cover
12 Motor drive shaft
13 Planetary gear box
14 Encoder
15 CableDrive assembly
16 Cable drum
17 Cable guide



Data Sheet

Low maintenance

The SlipGate's modular design allows it to be maintained in the field with minimal tools, training, and easily replaceable parts.

- Easily adjustable and replaceable gate seals
- On-site diagnostics built into the control software

Easy to install

Using a slide-in frame, SlipGates retrofit to existing check type regulating structures or mount to existing headwall structures to significantly reduce costs associated with civil work. They can also be mounted to purpose built emplacements.

In most cases a SlipGate can be installed and operational in two days; during irrigation or the off-season.

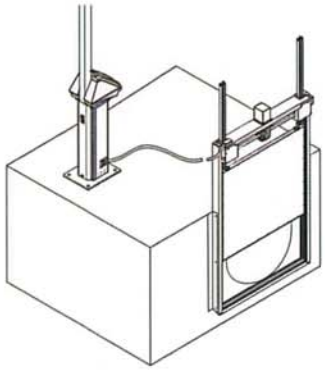
SlipGate® specifications

General	
Data interface	Local display (4 line LCD with keypad), Modbus serial, data interface
Unit of measure	User definable (metric/imperial [US])
Keypad language	English, Spanish, French, Chinese and Italian
Data tags	140+ available for integration into SCADA systems
Control	Local or remote via SCADA
Drive mechanism	CableDrive™ stainless steel wire rope and cable drum assembly for precision positioning and long life
Electronics	SolarDrive® power management and control technology housed in the local control pedestal. Each unit passes a 12hr heat soak pre-stress and 100% functional test.
Motor	12V DC
Seating/unseating head	Not affected by seating or unseating head due to double-sided seal
Gate position	256 count magnetic encoder
Seal performance	Less than 0.02 litres/second/metre of seal (exceeds American and European standards AWWA C513 and DIN 19569)
Actuation options	12V DC powered (solar); 120-240V AC powered; mechanical override; electrical override pendant and battery
Material	
Frames	Extruded marine grade aluminium
Gate panel	Composite laminate construction using marine grade aluminium sheetbonded to RTM Styrofoam on aluminium extrusion
Hardware	Stainless-steel
Shafts	Stainless-steel
Seals	EDPM rubber (Durometer 70 [Shore A])
Wear strip	PVC
Power	
Power supply	12VDC self-contained battery charged from solar panel or AC line power
Solar panel	Solar panel 85W monocrystalline
Batteries	2 or 3 12V 28 Ah with temperature sensor (~5yr life, provides ~5 days of operation without solar or AC line power)
Communications	
Protocols	Modbus, DNP3, MDLC

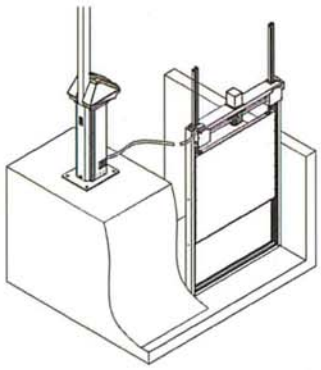
Specifications are believed to be correct as of April 2016. However, we reserve the right to alter specifications without notice.

Typical installations

(Note: Maximum length of cable from pedestal to gate is 9m)



Face mount



Side mount

RUBICON™

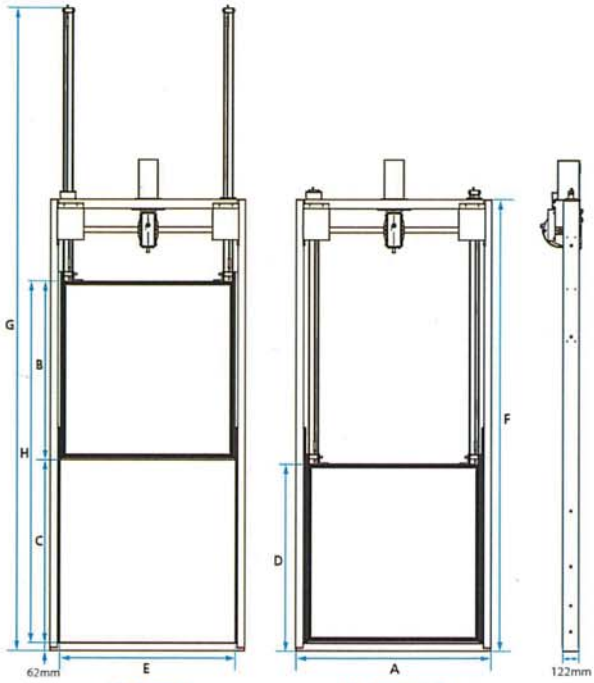
Dimensions and maximum water levels

Model	A	B	C	D	E	F	G	H	Weight
	mm	mm	mm	mm	mm	mm	mm	mm	kg
SG-1050-0915	1184	915	915	977	1034	2397	3388	1830	136
SG-1050-1220	1184	1220	1220	1282	1034	3007	4303	2440	155
SG-1050-1525	1184	1525	1525	1587	1034	3617	5218	3050	194
SG-1050-1830	1184	1830	1830	1892	1034	4227	6133	3660	157
SG-1180-0915	1314	915	915	977	1164	2397	3388	1830	146
SG-1180-1220	1314	1220	1220	1282	1164	3007	4303	2440	157
SG-1180-1525	1314	1525	1525	1587	1164	3617	5218	3050	165
SG-1180-1830	1314	1830	1830	1892	1164	4227	6133	3660	205
SG-1370-1220	1504	1220	1220	1282	1354	3007	4303	2440	167
SG-1370-1525	1504	1525	1525	1587	1354	3617	5218	3050	176
SG-1370-1830	1504	1830	1830	1892	1354	4227	6133	3660	217
SG-1485-1220	1619	1220	1220	1282	1469	3007	4303	2440	173
SG-1485-1525	1619	1525	1525	1587	1469	3617	5218	3050	183
SG-1485-1830	1619	1830	1830	1892	1469	4227	6133	3660	225
SG-1675-1220	1809	1220	1220	1282	1659	3007	4303	2440	185
SG-1675-1525	1809	1525	1525	1587	1659	3617	5218	3050	197
SG-1675-1830	1809	1830	1830	1892	1659	4227	6133	3660	240
SG-1790-1220	1924	1220	1220	1282	1774	3007	4303	2440	192
SG-1790-1525	1924	1525	1525	1587	1774	3617	5218	3050	201
SG-1790-1830	1924	1830	1830	1592	1774	4227	6133	3660	245

A Minimum structure width
B Gate panel height
C Opening height (maximum stroke)
D Top of gate panel (fully closed)
E Opening width (gate width)
F Frame height
G Overall height (fully open)
H Maximum check height (upstream water depth)

Contact Rubicon for complete dimensions. Consultation with a Rubicon engineer or agent is recommended prior to gate sizing. Utilise the standard orifice equations listed in the USBR Water Measurement Manual to determine the flow through an undershot gate. Weights are approximate.

Front and side views



About Rubicon Water

Rubicon Water delivers advanced technology that optimises gravity-fed irrigation, providing unprecedented levels of operational efficiency and control, increasing water availability and improving farmers lives.

Founded in 1995, Rubicon has more than 20,000 gates installed in TCC systems in 10 countries.

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Appendix B

"Irrigation District Efficiencies and Potential Water Savings in the Lower Rio Grande Valley of Texas", Guy Fipps, and Craig Pope

"Report 316 Evaluation of Ground-Water Resources in the Lower Rio Grande Valley", by the Texas Water Development Board, 1990

Irrigation District Efficiencies and Potential Water Savings in the Lower Rio Grande Valley of Texas

Guy Fipps and Craig Pope[1]

Abstract

Agriculture holds about 90 percent of all the water rights in the Lower Rio Grande Valley. Rapidly growing municipalities and industries are focusing the need to free up water for transfer from agriculture. This paper will give the results of an analysis of the 28 irrigation districts including their current efficiencies and opportunities for water savings. The analysis is based on reported efficiencies of each district, GIS-based maps and databases of district infrastructure, measurement of canal seepage losses, accounting systems, etc. Preliminary analysis indicate a potential water savings of 54,000 to 223,000 ac-ft/yr could result from improvements in the conveyance efficiency of 28 districts through renovations such as canal lining and pipeline replacement. Implementing a combination of on-farm practices of metering, gated pipe water delivery, and improved water management and/or technology could result in a water savings of between 98,000 and 217,000 ac-ft/yr.

Background

The Lower Rio Grande Valley in Texas is located at the south most tip of the state at the end of the Rio Grande River. About 98% of all the water used in the Lower Rio Grande Valley, in both Texas and Mexico, is from the Rio Grande River. The region is undergoing rapid population and industrial growth. The Texas Water Development Board projects that by the year 2050, the population in the Valley will more than double, and municipal and industrial water demand will increase by 171% and 48%, respectively.

The lower Rio Grande River is over appropriated; that is, there are more water right permits than firm yield. Agriculture holds about 90% of the water rights and, depending on the year, accounts for about 80% of total withdrawals from the river. Thus, water to meet future demand will likely come from agriculture. The purpose of this study is to determine how much water could be "freed-up" by making improvement in the irrigation systems of the region.

In 1998, the area conducted an Integrated Water Resources Planning (IWRP) effort to identify water needs and sources over the 50 year period 2000 - 2050. This paper summarizes the protion of the project that examined potential water savings in irrigation districts and on-farm irrigation.

Description of the Irrigation Districts

This study examines 28 water districts in Hidalgo, Cameron and Willacy Counties. These districts hold authorized agricultural water rights totaling 1,468,314 ac-ft (Table 1). Based on water rights holdings, the districts vary greatly in size, with the smallest district having 625 ac-ft of water rights and the largest district 174,776 ac-ft. Generally, these districts classify their water distribution networks into two categories: the "mains" and "laterals." The total miles of canals, pipeline and resacas comprising the main irrigation water distribution networks are summarized in Tables 2 and 3. Table 2 lists the total miles of the main canals by size (based on top width) and lining status. Table 3 provides the overall summary the extent of the main distribution networks which include 641.9 miles of canals, 9.7 miles of pipelines, and 44.6 miles of resacas.

Seepage and Conveyance Losses

We conducted a review of the scientific literature on canal seepage losses and improvements in district efficiencies from rehabilitation projects. We only found a few articles that reported seepage rates for different lining materials and soil types. Seepage rates from these studies are summarized in Tables 4 and 5. Table 5 is of particular interest and gives seepage rates measured in five irrigation districts in South Texas, including the United and San Benito Irrigation Districts. Details of the literature search will be given in a later report.

We measured seepage losses in five canals and one pipeline network using the ponding method. This testing was conducted in and with assistance from four districts. The results of the ponding tests are summarized in Table 6. The three lined canals had very high seepage loss rates compared to the scientific literature, indicating problems with their construction or maintenance. The seepage rates of the two unlined canals fell in the ranges reported in the scientific literature. The pipeline network measurements took place in the Brownsville Irrigation District and showed very little seepage during the 24 hour test.

The term *conveyance efficiency* (or *water duty*) is a measurement of all the losses in an irrigation distribution system from the river (or diversion point) to the field. Conveyance efficiency is calculated from the total amount of water diverted in order to supply a specific amount of water to a field (usually 6 inches). Conveyance efficiency is expressed as efficiency, the percent of water lost, or amount of water pumped (in feet). For example, District A must pump 8 inches from the river in order to deliver 6 inches to the field. District A's losses can be expressed as a:

- conveyance efficiency of 75%,
- water duty of 25%, or
- water duty of 0.67 ft.

Table 1. The official and common names of 28 irrigation and water supply districts in the Lower Rio Grande Valley and their authorized agricultural water rights.

Official Name	Common Name	Authorized Water Right (ac-ft)
Adams Gardens Irrigation District No. 19	Adams Garden	18,737
Bayview Irrigation District No. 11	Bayview	17,978
Brownsville Irrigation and Drainage District No. 5	Brownsville	34,876
Cameron County Irrigation District No. 3	La Feria	75,626
Cameron County Irrigation District No. 4	Santa Maria	10,182
Cameron County Irrigation District No. 6	Los Fresnos	52,142
Cameron County Water Improvement District No. 10	Rutherford-Harding	10,213
Cameron County Water Improvement	Cameron	3,913

District No. 16	#16	
Cameron County Water Improvement District No. 17	Cameron #17	625
Cameron County Water Improvement District No. 2	San Benito	151,941
Delta Lake Irrigation District	Delta Lake	174,776
Donna Irrigation District Hidalgo County No. 1	Donna	94,063
Engleman Irrigation District	Engleman	20,031
Harlingen Irrigation District No. 1	Harlingen	98,233
Hidalgo and Cameron Counties Irrigation District No. 9	Mercedes	177,151
Hidalgo County Improvement District No. 19	Sharyland	11,777
Hidalgo County Irrigation District No. 1	Edinburg	85,615
Hidalgo County Irrigation District No. 2	San Juan	147,675
Hidalgo County Water Irrigation District No. 3	McAllen #3	9,752
Hidalgo County Irrigation District No. 5	Progreso	14,234
Hidalgo County Irrigation District No. 6	Mission #6	42,545
Hidalgo County Irrigation District No. 16	Mission #16	30,749
Hidalgo County Irrigation District No. 13	Baptist Seminary	4,856
Hidalgo County Water Control and Irrigation District No. 18	Monte Grande	5,505
Hidalgo County Municipal Utility District No. 1	MUD	1,120
Santa Cruz Irrigation District No. 15	Santa Cruz	82,008
United Irrigation District of Hidalgo County	United	69,491
Valley Acres Water District	Valley Acres	22,500
		TOTAL 1,468,314

Table 2. Canal sizes and lining material for the main irrigation water distribution networks.

Top Width (feet)	Canal Type (or lining material, miles)	
	concrete	earth
< 10	41.6	1.0
10 - 20	98.0	11.9
20 - 30	25.2	52.2
30 - 40	3.8	35.1
40 - 50	1.1	60.1
50 - 75	1.4	30.9
75 - 100	0	11.1
> 100	0	9.7
Unknown Widths	99	134.5
Total Miles	270.1	346.4

Table 3. Miles of canals, pipelines and resacas for the main irrigation water distribution networks as shown on the Regional GIS Map (Fig. 1).

canals (miles)	pipelines (miles)	resacas (miles)	unknown (miles)	total (miles)
641.9	9.7	44.6	0.1	696.3

Conveyance loss includes a number of factors besides seepage and evaporation. Table 7 shows my classification system for conveyance losses which is composed of Transportation, Accounting, and Operational losses. The conveyance efficiencies as reported to us by 19 districts are listed in Table 8. The remaining 9 districts did not respond to survey and telephone requests for this information. The highest efficiencies are reported in smaller districts with extensive pipeline systems, while the lowest efficiencies are in larger districts which have undergone little rehabilitation. It should be pointed out that most districts do not have good data on their current conveyance efficiencies, and more work is needed to quantify these losses in order to target renovation programs.

We looked at the difference between the existing conveyance efficiencies and the efficiencies that which could reasonably be achieved by the districts through renovation projects. . For the present analysis, we assumed that an efficiency of 80 to 90% was obtainable for most districts. Starting with the conveyance efficiency estimates provided by the 19 districts (Table 8), we calculated the potential water savings if all districts were brought up to 80 and 90% conveyance efficiency. For the 9 districts not reporting efficiencies, we assumed a present value of 75%. **The total potential water savings from conveyance efficiency improvement for all districts is 54,000 to 223,000 ac-ft/yr.**

Water saving potentials were computed for low water use years and high water use years. A low water use year is defined as diversion of 35% of the authorized water right and a high water use year as 80%. Since water-short districts use a higher percentage of their water rights, 45 and 90% were used for low and high water use years, respectively. These portions are based on an analysis of water diversions by each district during the period 1989 - 1997.

There is some question about the accuracy of the basic information used to estimate conveyance efficiency, particularly:

1) the amount of water pumped or diverted into the system, and

2) the actual amount of water delivered to the field.

The doppler flow meters currently used at many river pumping plants were "calibrated" for each site based on estimates of the current pumping rates and/or pumping plant capacity, and on engine/motor and pump performance. Due to the physical layout of the pumping plants, it is difficult to independently verify these rates. Likewise, little metering is done at the field turn-out, and the amount delivered is also an estimate in most districts.

Table 4. Canal seepage rates reported in published studies.

Lining/Soil Type	Seepage Rate (gal/ft^2 /day)
plastic	0.08 - 3.74
concrete	0.06 - 3.22
gunite	0.06 - 0.94
compacted earth	0.07 - 0.6
clay	0.37 - 2.99
loam	4.49 - 7.48
sand	9.34 - 19.45

Sources: Bureau of Reclamation (1963); Nofziger, D.L. 1979. The influence of canal seepage on groundwater in Lugert Lake irrigation area. Oklahoma Water Resources Research Institute, OSU.

Table 5. Canal seepage rates reported in the Lower Rio Grande Valley.

Soil Type	Seepage Loss Rate (gal/ft^2 /day)
clay	1.5
silty clay loam	2.24
clay loam	2.99
silt loam earth	4.49
loam	7.48
fine sandy loam	9.35
sandy loam	11.22

Source: Texas Board of Water Engineers. 1946. Seepage Losses from Canals in Texas, Austin. July 1.

Table 6. Seepage rates measured by the DMS Team in 5 irrigation canals in

the Lower Rio Grande Valley.						
Test #	**Canal Type**	**Top Width (ft)**	**Length (ft)**	**Seepage Rate (gal/ft^2 /day)**	**Total Loss in Canal (ac-ft/mile)**	
					per day	**per year***
1	concrete	19	2557	4.28	0.81	243
2	earth (clay)	38	3342	1.62	0.82	246
3	earth (sandy clay loam)	45	6336	1.69	1.05	315
4	concrete	12	2583	2.12	0.20	60
5	concrete	12.5	9525	2.49	0.25	75

*based on 300 days per year.

Table 7. Classification of the sources of water loss in irrigation districts.		
Transportation	**Accounting**	**Operation**
seepage in main, unlined canals seepage in secondary territory unlined canals (laterals) leakage from lined canals leakage from pipelines evaporation (canals and storage reservoirs)	accuracy of field-level deliveries (estimates of canal riders/irrigators) unauthorized use metering at main pumping plant water rights accounting system	charging empty pipelines and canals spills (end of canals) partial use of water in dead-end lines

Table 8. Estimated conveyance efficiency as supplied by 19 districts.			
District	**Conveyance Efficiency (%)**	**District**	**Efficiency (%)**
Adams Garden	85	HCMUD	90
Bayview	85	HCWID#3 (McAllen)	90
Brownsville	90	HCWID#5 (Progresso)	92

CCID#2 (San Benito)	40	HCCID#9 (Mercedes)	75
CCID#6 (Los Fresnos)	60	HCID#16 (Mission)	85
Delta Lake	75	HCWCID#18	95
Donna	58	La Feria IDCC#3	75
Harlingen	85	Santa Cruz ID#15	75
HCID#1 (Edinburg)	80	Santa Maria IDCC#4	75
HCID#2 (San Juan)	77		

On-farm Potential Water Savings

On-farm irrigation efficiency is defined as the ratio of the amount of water needed to grow the crop to the amount of water delivered to a field. The amount of water needed to grow a crop is usually estimated from ET (evapotranspiration) data as adjusted for beneficial rainfall and leaching requirements. Generally, surface irrigation systems, such as found in the Lower Rio Grande Valley, have low efficiencies and ranges from 30 to 80%. Generally, we expect on-farm surface irrigation efficiencies of 60 - 70%. Various practices and field improvements can increase this efficiency to 70 - 80%, or even higher with good management and improved technology.

Table 9 provides the observed water savings reported in 4 districts (Bayview, Brownsville, Delta Lakes, San Benito) from recent experiments with layflat tubbing replacement of siphon tubes and on-farm metering. In some cases, improved technology or water management were also implemented. The numbers reported for Donna and La Feria are for metering only. It should be noted that hard data to support many of these observations do not exist.

These observations and supporting information show that significant water savings at the farm level are possible in the Lower Rio Grande Valley. However, one major limiting factor is that in about half of the area, water is delivered to the field with inadequate "head" (insufficient volume and/or pressure) to allow for efficient furrow irrigation. Without improvements in the distribution systems, on-farm water saving potential in about half the irrigated land will be limited.

For the analysis used in the IWRP project, we classified potential on-farm water savings into three components:

1) metering,
2) gated pipe replacement of field ditches and siphon tubes, and
3) high water management and/or improved irrigation technology.

Table 10 gives the expected range of water savings for each practice and the factor used in this analysis. Table 11 summarizes the assumptions used in applying these factors to this region. For example, the first two factors (metering and gated pipe) were not applied to the area currently under the practice. In addition, benefits from high water management were not applied to the half of the area with head problems. Increased on-farm efficiency can only be achieved in these areas by improvements in the distribution systems and/or adoption of pumped and pressurized irrigation systems such as drip and sprinkler irrigation.

On-farm water saving potential were calculated for high and low water use years as discussed above. **The results are a potential on-farm water savings of 98,000 to 217,000 ac-ft/yr.** However, an intensive technical assistance and education program would be needed to achieve such savings.

Table 9. Water savings observed or estimated from metering and poly pipe experiments during the 1990s in the Lower Rio Grande Valley.

district	water savings observed
Bayview	36%1
Brownsville	33%1
Donna	20%2
La Feria	10%2
Delta Lakes	33%1
San Benito	40%1

1 may include additional benefits from implementing improved on-farm water management practices or due to changes in irrigation technology
2 metering only

Table 10. Factors used for calculation of on-farm water saving potential in the IWRP Project.

technique	expected water savings	factor used
metering	0 - 15 %	10 %
poly/gated pipe replacement of field ditches/siphon tubes	5 - 20 %	10 %
high management/improved irrigation technology	10 - 30 %	20 %

Table 11. Assumptions for applying water savings factors in Table 16 to the Lower Rio Grande Valley.

technique	assumptions for calculations
metering	- adopted Valley-wide by 2010 - 20% of land area is assumed to be metering - factor applied to remaining 80%
poly/gated pipe	- adopted by 90% of Valley by 2010 - approximately 50% of Valley already using gated/poly pipe - factor applied to remaining 40% of Valley not currently using poly/gated pipe (0.9 - 0.5 = 0.4)
	- adopted on half of Valley by 2010 - approximately 20% of area currently

high management/improved irrigation technology	under high management or using improved technologies - factor applied to 30% of area (0.5 - 0.2 = 0.3)

1 Professor and Extension Agricultural Engineer, and Graduate Research Assistant, Department of Agricultural Engineering, Texas A&M University, College Station, TX 77843-2117.

Texas Water Development Board

Report 316

Evaluation of Ground-Water Resources In the Lower Rio Grande Valley, Texas

by
T. Wesley McCoy, Geologist

January 1990

Appendix C

"Gulf Coast Jaguarundi Recovery Plan, First Revision," U.S Fish and Wildlife Service; December, 2013

"Ocelot Recovery Plan, Draft First Revision", U.S Fish and Wildlife Service Sothern Region; August, 1990

USFWS List of Endangered Species in Texas

GULF COAST JAGUARUNDI RECOVERY PLAN
(*Puma yagouaroundi cacomitli*)

FIRST REVISION
Original version part of
Listed Cats of Texas and Arizona, 1990

Photo Credit: Feline Research Center/CKWRI

Southwest Region
U.S. Fish and Wildlife Service
Albuquerque, New Mexico
December 2013

Approved: _____ Date: 12/20/13
Regional Director, Region 2,
U.S. Fish and Wildlife Service

ACTING

OCELOT RECOVERY PLAN

(*Leopardus pardalis*)

DRAFT FIRST REVISION

Original Approval: August 22, 1990

Southwest Region
U.S. Fish and Wildlife Service
Albuquerque, New Mexico

U.S. Fish & Wildlife Service

ECOS

ECOS / Species Reports / Species occurrence by state / Listed species believed to or known to occur in Texas

Listed species believed to or known to occur in Texas

Notes:

- **As of 02/13/2015 the data in this report has been updated to use a different set of information. Results are based on where the species is believed to or known to occur. The FWS feels utilizing this data set is a better representation of species occurrence. Note: there may be other federally listed species that are not currently known or expected to occur in this state but are covered by the ESA wherever they are found; Thus if new surveys detected them in this state they are still covered by the ESA. The FWS is using the best information available on this date to generate this list.**
- This report shows listed species or populations believed to or known to occur in Texas
- This list does not include experimental populations and similarity of appearance listings.
- This list includes species or populations under the sole jurisdiction of the National Marine Fisheries Service.
- Click on the highlighted scientific names below to view a Species Profile for each listing.

Listed species -- 99 listings

Animals -- 69 listings

Status	Species/Listing Name
E	Amphipod, diminutive (*Gammarus hyalleloides*)
E	Amphipod, Peck's cave (*Stygobromus (=Stygonectes) pecki*)
E	Amphipod, Pecos (*Gammarus pecos*)
E	Bat, Mexican long-nosed Entire (*Leptonycteris nivalis*)

T	Bear, Louisiana black Entire (*Ursus americanus luteolus*)
E	Beetle, American burying Entire (*Nicrophorus americanus*)
E	Beetle, Coffin Cave mold Entire (*Batrisodes texanus*)
E	Beetle, Comal Springs dryopid (*Stygoparnus comalensis*)
E	Beetle, Comal Springs riffle (*Heterelmis comalensis*)
E	Beetle, Helotes mold (*Batrisodes venyivi*)
E	Beetle, Kretschmarr Cave mold Entire (*Texamaurops reddelli*)
E	Beetle, [no common name] (*Rhadine exilis*)
E	Beetle, [no common name] (*Rhadine infernalis*)
E	Beetle, Tooth Cave ground Entire (*Rhadine persephone*)
E	Crane, whooping except where EXPN (*Grus americana*)
T	Cuckoo, yellow-billed Western U.S. DPS (*Coccyzus americanus*)
E	Curlew, Eskimo Entire (*Numenius borealis*)
E	Darter, fountain Entire (*Etheostoma fonticola*)
E	falcon, northern aplomado Entire, except where listed as an experimental population (*Falco femoralis septentrionalis*)
E	Flycatcher, southwestern willow Entire (*Empidonax traillii extimus*)
E	Gambusia, Big Bend Entire (*Gambusia gaigei*)
E	Gambusia, Clear Creek Entire (*Gambusia heterochir*)
E	Gambusia, Pecos Entire (*Gambusia nobilis*)
E	Harvestman, Bee Creek Cave Entire (*Texella reddelli*)
E	Harvestman, Bone Cave Entire (*Texella reyesi*)
E	Harvestman, Cokendolpher Cave (*Texella cokendolpheri*)

E	Jaguarundi, Gulf Coast Wherever found (*Herpailurus (=Felis) yagouaroundi cacomitli*)
T	Knot, red (*Calidris canutus rufa*)
E	Manatee, West Indian Entire (*Trichechus manatus*)
E	Meshweaver, Braken Bat Cave (*Cicurina venii*)
E	Meshweaver, Government Canyon Bat Cave (*Cicurina vespera*)
E	Meshweaver, Madla's Cave (*Cicurina madla*)
E	Meshweaver, Robber Baron Cave (*Cicurina baronia*)
T	Minnow, Devils River Entire (*Dionda diaboli*)
E	Ocelot wherever found (*Leopardus (=Felis) pardalis*)
T	Owl, Mexican spotted Entire (*Strix occidentalis lucida*)
T	Plover, piping except Great Lakes watershed (*Charadrius melodus*)
E	Prairie-chicken, Attwater's greater Entire (*Tympanuchus cupido attwateri*)
T	Prairie-chicken, lesser (*Tympanuchus pallidicinctus*)
E	Pseudoscorpion, Tooth Cave Entire (*Tartarocreagris texana*)
E	Pupfish, Comanche Springs Entire (*Cyprinodon elegans*)
E	Pupfish, Leon Springs Entire (*Cyprinodon bovinus*)
E	Salamander, Austin blind (*Eurycea waterlooensis*)
E	Salamander, Barton Springs Entire (*Eurycea sosorum*)
T	Salamander, Georgetown (*Eurycea naufragia*)
T	Salamander, Jollyville Plateau (*Eurycea tonkawae*)
T	Salamander, Salado (*Eurycea chisholmensis*)
T	Salamander, San Marcos Entire (*Eurycea nana*)
E	Salamander, Texas blind Entire (*Typhlomolge rathbuni*)

T	Sea turtle, green Except where endangered (*Chelonia mydas*)
E	Sea turtle, hawksbill Entire (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley Entire (*Lepidochelys kempii*)
E	Sea turtle, leatherback Entire (*Dermochelys coriacea*)
T	Sea turtle, loggerhead Northwest Atlantic Ocean DPS (*Caretta caretta*)
T	Shiner, Arkansas River Arkansas R. Basin (*Notropis girardi*)
E	Shiner, sharpnose (*Notropis oxyrhynchus*)
E	Shiner, smalleye (*Notropis buccula*)
E	Snail, Pecos assiminea (*Assiminea pecos*)
E	Spider, Government Canyon Bat Cave (*Neoleptoneta microps*)
E	Spider, Tooth Cave Entire (*Neoleptoneta myopica*)
E	Springsnail, Phantom (*Pyrgulopsis texana*)
E	Tern, least interior pop. (*Sterna antillarum*)
E	Toad, Houston Entire (*Bufo houstonensis*)
E	Tryonia, Diamond (*Pseudotryonia adamantina*)
E	Tryonia, Gonzales (*Tryonia circumstriata (=stocktonensis)*)
E	Tryonia, Phantom (*Tryonia cheatumi*)
E	Vireo, black-capped Entire (*Vireo atricapilla*)
E	Warbler (=wood), golden-cheeked Entire (*Dendroica chrysoparia*)
E	Woodpecker, red-cockaded Entire (*Picoides borealis*)

Plants -- 30 listings

Status	**Species/Listing Name**
E	Ambrosia, south Texas (*Ambrosia cheiranthifolia*)

E	Ayenia, Texas (*Ayenia limitaris*)
E	Bladderpod, white (*Lesquerella pallida*)
E	Bladderpod, Zapata (*Lesquerella thamnophila*)
E	Cactus, black lace (*Echinocereus reichenbachii var. albertii*)
T	Cactus, Chisos Mountain hedgehog (*Echinocereus chisoensis var. chisoensis*)
T	Cactus, Lloyd's Mariposa (*Echinomastus mariposensis*)
E	Cactus, Nellie cory (*Coryphantha minima*)
E	Cactus, Sneed pincushion (*Coryphantha sneedii var. sneedii*)
E	Cactus, star (*Astrophytum asterias*)
E	cactus, Tobusch fishhook (*Sclerocactus brevihamatus ssp. tobuschii*)
E	Cat's-eye, Terlingua Creek (*Cryptantha crassipes*)
T	Cory cactus, bunched (*Coryphantha ramillosa*)
E	Dawn-flower, Texas prairie (*Hymenoxys texana*)
E	Dogweed, ashy (*Thymophylla tephroleuca*)
E	Gladecress, Texas golden (*Leavenworthia texana*)
E	Ladies'-tresses, Navasota (*Spiranthes parksii*)
E	Manioc, Walker's (*Manihot walkerae*)
T	No common name (*Geocarpon minimum*)
T	Oak, Hinckley (*Quercus hinckleyi*)
E	Phlox, Texas trailing (*Phlox nivalis ssp. texensis*)
E	Pitaya, Davis' green (*Echinocereus viridiflorus var. davisii*)
E	Pondweed, Little Aguja (=Creek) (*Potamogeton clystocarpus*)

E	Poppy-mallow, Texas (*Callirhoe scabriuscula*)
T	Rose-mallow, Neches River (*Hibiscus dasycalyx*)
E	Rush-pea, slender (*Hoffmannseggia tenella*)
E	Sand-verbena, large-fruited (*Abronia macrocarpa*)
E	Snowbells, Texas (*Styrax texanus*)
T	Sunflower, Pecos (=puzzle, =paradox) (*Helianthus paradoxus*)
E	Wild-rice, Texas (*Zizania texana*)

Appendix D

"Economic Impact Estimate of Irrigation Water shortage on the Lower Rio Grande Valley Agriculture", Texas A&M University AgriLife Extension, June, 2013

TEXAS A&M AGRILIFE EXTENSION

Economic Impact Estimate of Irrigation Water Shortages on the Lower Rio Grande Valley Agriculture

Luis A. Ribera[1] and Dean McCorkle[2]
[1]Associate Professor and Extension Economist
[2]Extension Program Specialist
Texas A&M AgriLife Extension Service

The value of agricultural production in the Lower Rio Grande Valley (LRGV) region, which includes Cameron, Hidalgo, Starr and Willacy counties, was approximately $820 million in 2012 (Table 1). Total crop production accounted for about $666 million or 81.2 % of total agricultural production led by feed crops, cotton, vegetables, miscellaneous crops, and fruits and nuts. Livestock production and agricultural related production was $67.5 and $87.7 million, respectively.

Table 1. Estimated Value of Agricultural Production for the LRGV, 2012

	Cameron	Hidalgo	Starr	Willacy	Total LRGV
		(Thousands of Dollars)			
Feed Crops	52,639	66,410	5,718	53,392	178,159
Cotton	60,034	37,317	1,890	27,669	126,910
Oil Crops	374	9,836	2,342	0	12,552
Vegetable Crops	7,955	100,000	3,931	7,857	119,743
Fruits & Nuts	7,494	64,196	0	318	72,008
Sugar Cane	12,186	24,402	0	5,231	41,819
Misc. Crops	50,000	64,503	0	0	114,503
Beef	1,860	20,353	32,874	6,675	61,762
Other Meat Animals	0	5,550	58	31	5,639
Livestock Products	0	70	0	0	70
Ag. Related	51,454	31,200	3,400	1,682	87,736
Total Crops	190,682	366,664	13,881	94,468	665,695
Total Livestock	1,860	25,973	32,932	6,706	67,471
Ag. Related	51,454	31,200	3,400	1,682	87,736
Total Agriculture	**243,996**	**423,837**	**50,213**	**102,856**	**820,902**

Source: Estimated Value of Agricultural Production and Related Items, Texas AgriLife Extension Service, May 2013.

Irrigation water is very important to agricultural production in the LRGV region where about half of its crop production acreage is irrigated. Irrigation water shortages in the LRGV have occurred since the mid-1990s (Robinson, 2002). These shortages followed the point in 1992, when Mexico began undersupplying the average minimum annual amount of 350,000 acre-feet of water into the Rio Grande and continue nowadays. The treaty of 1944 requires Mexico to deliver the 350,000 minimum average annual acre-feet over the defined five-year cycles. The water deficit for the current five-year cycle is 430,000 acre-feet (TCEQ, 2013).

The purpose of this paper is to estimate the economic impact of the absence of irrigation water for crop production in the LRGV region. The crops affected by the absence of irrigation water are row crops (mainly sorghum, cotton and corn) and specialty crops (mainly vegetables, citrus and sugarcane). Row crops can be grown either irrigated or dryland while specialty crops can only be grown irrigated. All row crops and specialty crops are annual crops except for citrus and sugarcane. The lifespan of a citrus tree is over 30 years while sugarcane is typically five years. The methodology used in this study is an *ex post* historical crop damage approach where the economic impacts are estimated by measuring the change in farm gate or regional gross value of affected row crops and specialty crops.

Row Crops

To estimate the impact of the lack of irrigation water in row crops, the difference between irrigated and dryland yields are estimated and multiplied by the irrigated acreage for the crop. To account for the year-to-year fluctuations in yields and crop acres, a 5-year average (2008-2012) of crop yields and acreage is used to project the impacts for 2013. For example, using the estimated cotton yield difference between irrigated and dryland production (488 lbs. per acre), the 5-year average irrigated cotton acres, and the 2013 estimated cotton price; the loss in farm-gate cotton revenue is estimated at $12.5 million for 2013 (Table 2). Therefore, with the absence of water, irrigated row crops will produce dryland yields, causing a reduction in row crop farm-gate values of $12.5, $4.5 and $14.1 million for cotton, corn and sorghum, respectively. The total farm-gate loss for row crops is estimated at $31.2 million.

Table 2. Row Crop Losses due to Lack of Irrigation Water in the LRGV

	Yield[1]	Yield Loss[1]	Acreage[2]	2013 Price[3]	Total
	5-year average				Farm Gate
Cotton					
Irrigated	1,017 (lbs)	-488 (lbs)	32,273	$0.80/lb	$12,554,709
Dryland	528 (lbs)		76,572		
Corn					
Irrigated	99 (bu)	-22 (bu)	31,317	$6.61/bu	$4,533,345
Dryland	77 (bu)		8,034		
Sorghum					
Irrigated	77 (bu)	-29 (bu)	80,267	$6.00/bu	$14,134,952
Dryland	48 (bu)		284,450		
Total Row Crop Loss					$31,223,006

1/ USDA-NASS Quick Stats for LRGV region, 2008-2012.
2/ USDA-FSA annual crop acreage report for LRGV region, 2008-2012.
3/ CME Group Cotton, Corn and Sorghum July 2013 Prices.

TEXAS A&M AGRILIFE EXTENSION

Specialty Crops

To estimate the impact of the lack of irrigation water in specialty crops, these crops were divided between perennial, i.e. citrus, and annual crops, i.e. vegetables and sugarcane. Citrus production would be close to zero, but in general, trees would survive a season without irrigation water. It is assumed that citrus orchards would not be turned into an annual crop since replacing mature trees is very expensive. Therefore, the economic loss of the lack of irrigation water at the farm-level would be the 5-year average value of citrus production in the LRGV region, $45.82 million (Table 3). Vegetables and sugarcane production would be lost as well as irrigation water is needed for their production. Estimated economic loss at the farm-level would be the 5-year average value of production, $128.21 and $47.36 million for vegetable and sugarcane production, respectively (Table 3). The total value of specialty crop production is $221.3 million.

Table 3. Specialty Crop Acreage and Value of Production Loss

	Acreage[1]	Value of Production[2]
	5-year average	
Citrus	27,038	$45,822,200
Vegetables	29,303	$128,211,200
Sugarcane	40,812	$47,361,180
Total Specialty Crop Loss		$221,394,580

1/ USDA-FSA annual crop acreage report for LRGV region, 2008-2012.
2/ Estimated Value of Agricultural Production and Related Items, Texas AgriLife Extension Service, May 2013.

However, it is improbable that the acreage used in vegetable and sugarcane production would remain out of crop production; instead they would be converted into dryland crop production, which for the LRGV region would most likely be cotton, corn or sorghum. The methodology used to redistribute this acreage includes the 5-year average crop mix in the LRGV region and using the same crop mix ratio to convert the vegetable and sugarcane acreage into row crops (Table 4). Therefore, 21% of the converted acreage would go into cotton, 8% into corn and 71% into sorghum production; accounting for $23.39 million in production value at the farm-level. This value, $23.39 million, is subtracted from the total loss of specialty crop production. Therefore, the total crop production loss due to the lack of irrigation water in the LRGV region is estimated at $229.24 million, which includes row crop losses of $31.22 million, plus the specialty crops losses of $221.39 million, less the value of row crop production of the converted vegetable and sugarcane acreage, $23.39 million.

Table 4. Value of Production of Vegetables and Sugarcane Acreage Turned Into Row Crop Production

	Crop Mix[1]	Acreage Mix	Yield[2]	Price[3]	Value
	5-year average		Dryland		
Cotton	21%	14,879	528	$0.80	$6,284,925
Corn	8%	5,379	77	$6.61	$2,737,867
Sorghum	71%	49,857	48	$6.00	$14,358,794
Total Gross Revenue					$23,381,586

1/ USDA-FSA annual crop acreage report for LRGV region, 2008-2012.
2/ USDA-NASS Quick Stats for LRGV region, 2008-2012.
3/ CME Group Cotton, Corn and Sorghum July 2013 Prices.

Total Economic Impact

The IMPLAN input-output model was used to assess the broader economic effects associated with the estimated $229.24 million crop revenue loss associated with a loss of irrigation water. These effects are measured via three indicators – employment, value added, and economic output. Employment represents both full and part-time jobs, value added is a measure of net business income and employee compensation, and economic output represents gross business activity (spending) associated with irrigated crop production. Value added also represents a contribution to Texas' Gross Domestic Product (GDP), the most commonly used indicator of the health of the state's economy.

Each of these indicators is measured at three different levels: direct effects represent the farm-level effects; indirect effects represent effects in industries that provide input supplies (fertilizer, fuel, etc.) to farms, and induced effects represent the economic impacts associated with the spending of salaries and wages on household goods. The loss of irrigated crop production in the LRGV region would lead to an estimated $394.9 million loss in economic output (Table 5). Likewise, the loss of irrigated crop production in the LRGV region would generate a loss of $217.61 million in value added. In terms of employment, the loss of irrigation would result in an estimated loss of 4,840 jobs that depend on the production and sales of these commodities for some portion of their income.

Table 5. 2013 Projected Economic Losses Associated with Lack of Irrigation Water in the LRGV

Impact Type	Employment	Total Value Added	Output
Direct Effect	3,041.6	$117,175,997	$229,235,999
Indirect Effect	1,292.2	$66,615,832	$109,530,397
Induced Effect	506.3	$33,820,341	$56,130,084
Total Effect	4,840.1	$217,612,170	$394,896,481

Value added and economic output are two distinct indicators, and as such are not to be added together.

This analysis represents the impacts of all economic activities that occur in the production of the described crops, up until the point of sale of the crops at the farm-level. These results are on the conservative side as they do not include the impacts (losses) that occur beyond the farm-level sale of the crops, such as transportation, storage, processing, packaging, and marketing.

References

Minnesota IMPLAN Group, Inc., 2009, IMPLAN System, 502 2nd St., Hudson, WI 54016 (Implan.com).

Robinson, John R.C. "Alternative Approaches to Estimate the Impact of Irrigation Water Shortages on Rio Grande Valley Agriculture." Texas Cooperative Extension, May 17, 2012.

[TCEQ] Texas Commission on Environmental Quality. "Rio Grande Valley Suffers While Mexico Withholds Water." News release, April 16, 2013. Available at: http://www.tceq.texas.gov/news/releases/4-16waterdeficit

Appendix E
CCID2 Water Conservation Plan and a Drought Contingency Plan

WATER ALLOCATION GUIDELINES
OF THE
CAMERON COUNTY IRRIGATION DISTRICT #2

April 22, 2014

Section I: Declaration of Policy, Purpose and Intent

The Board of Directors of the Cameron County Irrigation District #2 deems it to be in the best interest on the District to adopt Guidelines governing the equitable and efficient allocation of limited water supplies during times of shortage. These Guidelines constitute the District's drought contingency plan required under Section 11.1272, Texas Water Code, *Vernon's Texas Codes Annotated,* and associated administrative rules of the Texas Natural Resource Conservation Commission (Title 30, Texas Administrative Code, Chapter 288).

Section II: User Involvement

Opportunity for users of water from the Cameron County Irrigation District #2 was provided by means of a notice posted at the District's main office.

Section III: User Education

The Cameron County Irrigation District #2 will periodically provide water users with information about the Plan, including information about the conditions under which allocation is to be initiated or terminated and the district's policies and procedures for water allocation. This information will be provided by means of posting water allocation guidelines on the district's public bulletin board.

Section IV: Authorization

The General Manager is hereby authorized and directed to implement the applicable provisions of this Plan upon determination by the Board that such implementation is necessary to ensure the equitable and efficient allocation of limited water supplies during times of shortage.

Section V: Application

The provisions of this Plan shall apply to all persons utilizing water provided by the Cameron County Irrigation District #2. The term "person" as used in the Plan includes individuals, corporations, partnerships, associations, and all other legal entities.

Section VI: Initiation of Water Allocation

The General Manager shall monitor water supply conditions on a monthly basis and shall make recommendations to the Board regarding initiation of water allocation. Upon

approval of the Board, water allocation will become effective when the storage balance in the District's irrigation water right account reaches less that fifty percent (50%) of the available amount of water that the District is entitled to have in the current year, in Falcon and Amistad Reservoirs.

Section VII: Termination of Water Allocation

The district's water allocation policies will remain in effect until the conditions defined in Section IV of the Plan no longer exist and the Board deems that the need to allocate water no longer exits.

Section VIII: Notice

Notice of the initiation or termination of water allocation will be given by notice posted on the District's public bulletin board and by publication in the local newspaper.

Section IX: Water Allocation

(a) Upon initiation of water allocation, each irrigation user shall be allocated an equal amount of irrigation(s) per acre, depending on the amount of water in the District's irrigation account, for each flat rate acre on which all flat rate assessments have been paid, and on which the water account has remained active for a (24) twenty-four month period. The water allotment in each irrigation account will be expressed in acres.

(b) As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed to those irrigation users as defined in Section 11.039 of the Texas Water Code.

(c) The amount of water charged against a user's water allocation will be one acre-foot per acre irrigated, or one allocation unit, unless water deliveries to the land are metered. Metered water deliveries will be charged based on actual measured use. It shall be a violation of these guidelines for a water user to use water in excess of water contained in the user irrigation account.

(d) Acreage in an irrigation account that has not been irrigated for any reason within the last two- (2) consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two- (2) consecutive years may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

Section X: Transfers of Allotments

(a) A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or a part of the water allocation from the described land of the landowner covered by the irrigation account.

(b) A water allocation may not be transferred to land owned by the landowner outside the District boundaries.

(b) Water from outside the District may be transferred by a landowner for use within the District. The District will divert and deliver the water on the same basis as District water is delivered, except that a (25%) twenty-five percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.

Section XI: Water Delivered to Municipal Suppliers

Water is delivered to municipal suppliers in accordance with existing contracts and the District's water conservation plan and drought contingency plan. Upon the activation of the District's drought contingency provisions, the District will coordinate with municipal suppliers to whom it delivers Rio Grande water for treatment. Normally, if the District expects a shortage in irrigation deliveries which could make it difficult to maintain deliveries to municipal suppliers, it will advise its municipal suppliers, if reasonably possible, at least sixty (60) days in advance, of this possibility, otherwise, as soon as is possible. A copy of this notice will be sent to Rio Grande Watermaster and Texas Water Development Board. Following such notice, the District will monitor available water supply and irrigation deliveries in coordination with the Rio Grande Watermaster, Texas Water Development Board and municipal suppliers during the shortage period.

Section XII: Coordination With Regional Water Planning Group

A copy of this drought management plan shall be filed with the Rio Grande Regional Water Planning Group (Region M, Texas Water Development Board) and the District will coordinate its activities so as to ensure consistency with the approved Regional Water Plan.

Section XIII: Penalties

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of section 11.083 of the Texas Code may be assessed an administrative penalty up to $5,000.00 a day under section 11.0842 of the Texas Water Code. Additionally, if the violator is also taking, diverting, or appropriating state water, the violator may be assessed a civil penalty in court of up to $5,000.00 a day. Someone who is aggrieved by these violations may sue the violator for injunctive relief and civil

damages in court.

Section XII: Severability

It is hereby declared to be the intention of the Board of Directors of the Cameron County Irrigation District #2, that the sections, paragraphs sentences, clauses, and phrases of the Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

Section XIII: Authority

The foregoing guidelines are adopted pursuant to and in accordance with Sections 11.039, 11.083, 11.1272; Section 49.004; and Section 58.127-130 of the Texas Water Code, *Vernon's Texas Codes Annotated.*

Section XIV: Effective Date of Plan

The effective date of this Plan shall be five (5) days following the date of Publication hereof and ignorance of the guidelines is not a defense for a prosecution for enforcement of the violation of the guidelines.

RESOLUTION OF THE BOARD OF DIRECTORS
ADOPTING A WATER CONSERVATION PLAN FOR
THE CAMERON COUNTY IRRIGATION DISTRICT #2
April 22, 2014

WHEREAS, the Board recognizes that the amount of water available to the Cameron County Irrigation District #2 and to its irrigation water customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes.

WHEREAS, Applicable rules of the Texas Natural Resource Conservation Commission require all public water supply systems in Texas to prepare a water conservation plan.

WHEREAS, Section 11.039 of the Texas Water Code authorizes water suppliers to distribute available water supplies on a pro rata basis during times of water supply shortage; and

WHEREAS, as authorized under law, and in the best interests of the customers of the Cameron County Irrigation District #2, the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE CAMERON COUNTY IRRIGATION DISTRICT #2:

SECTION 1. That the Water Conservation Plan attached hereto and hereby adopted as the official policy of the Cameron County Irrigation District #2.

SECTION 2. That the General Manager is hereby directed to implement, administer, and enforce the Water Conservation Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE CAMERON COUNTY IRRIGATION DISTRICT #2, ON THIS THE 22 ND DAY OF April 2014.

Bill McMurray
President, Board of Directors

Attested to:

William Goar
Secretary, Board of Directors

CAMERON COUNTY IRRIGATION DISTRICT NO. TWO

1301 FM 510 P.O. BOX 687 SAN BENITO, TEXAS 78586
Phone (956) 399-2484 Fax (956) 399-4721
Sonia Lambert- General Manager

April 25, 2014

Rio Grande Regional Water Planning Group, Region M
Glenn Jarvis, Chairman
301 W. Railroad St.
Weslaco, Texas 78596

Dear Mr. Jarvis,

Enclosed please find Cameron County Irrigation District #2's Water Conservation Plan and a copy of the Board adopted resolution approving the plan. This Water Conservation Plan is for the period of May 1, 2014 through April 30, 2019.

If you have any questions please do not hesitate to contact me at (956) 399-2484.

Sincerely,

Sonia Lambert
General Manager

SL/le
Enclosures

WATER CONSERVATION PLAN
FOR THE
CAMERON COUNTY IRRIGATION DISTRICT #2
April 22, 2014

In an effort to establish an Irrigation District where water is used efficiently and conservatively, Cameron County Irrigation District #2 sets forth the following water conservation plan.

Cameron County Irrigation District #2 currently has approximately 48,000 acres production, which include acreage for vegetables, cotton, grain, pasture, orchards, and sugar cane. Our total servicing area is approximately 110 square miles. Water is diverted from the Irrigation District's pumping plant facilities located on the United States side of the Rio Grande River at Los Indios, Texas. After pumping from the river, the water is then transported to two main canals one of, which provides water to the south side of the District, and the other to two reservoirs, which provide water to the north side of the District along with other resacas. All water travels north through open canals.

The District delivers approximately 10,611 acre-feet of Rio Grande water to the City of San Benito, East Rio Hondo Water Supply, City of Rio Hondo and Arroyo Water Supply Corporation under existing water supply and delivery contracts. This water is delivered from the District's irrigation canal and pipeline system and is metered at the delivery point to the City of San Benito, East Rio Hondo Water Supply, City of Rio Hondo and Arroyo Water Supply Corporation. The amount of water measured at the Rio Grande is reported monthly to the Rio Grande Watermaster and is based upon the amount of water delivered plus transportation losses. The Rio Grande Watermaster charges these deliveries against the applicable municipal priority water allocation.

In the future, water supply and delivery contracts entered into for the furnishing of Rio Grande water to municipal suppliers, or any extension of existing contract, shall contain provisions that the customer shall develop and implement a water conservation plan or water conservation measures using the applicable elements contained in Title 30, Texas Administrative Code, Chapter 288, and in the event, after treatment, such water is resold to another supplier, then such contract shall also contain provisions dealing with water conservation requirements in accordance with Title 30, Texas Administrative Code, Chapter 288.

A copy of this Water Conservation Plan shall be filed with the Rio Grande Regional Water Planning Group (Region M, Texas Water Development Board), or its successor, and the District will coordinate its activities in order to ensure consistency with approved Regional Water Plans.

Conservation Goals:

1. Landowners and/or canal riders report all leaks to the District's office.
2. Water is shut off at the gate immediately after acreage has been irrigated to avoid spills.
3. No irrigation will begin until canal rider has been notified of intent to irrigate, conservation measures have been taken, and amount of acreage to be irrigated is specified for the control of quantity of water.
4. Land leveling is recommended for long term permanent reduction in irrigation water use.
5. Poly pipes are being installed to use water more effectively and efficiently.
6. District has sold water rights to begin to rehabilitate the District by putting canals underground into pipeline for conservation.

Monitoring and Record Management

Cameron County Irrigation District #2 uses a canal rider supervisor to check the structural facilities for storage, conveyance and delivery of water. Canal riders monitor the water being used to account for the water paid in the amount of $8.00 per acre. A copy of the order placed for water is provided to the canal rider who will turn the order back in when completed or with notification of cancellation of such order.

Penalties:

Any person who willfully opens, closes, changes or interferes with any headgate or used water in violation of section 11.083 of the Texas Code may be assessed an administrative penalty up to $5,000.00 a day under section 11.0842 of the Texas Water Code. Additionally, if the violator is also taking, diverting, or appropriating state water, the violator may be assessed a civil penalty in court of up to $5,000.00 a day. Someone who is aggrieved by these violations may sue the violator for injunctive relief and civil damages in court.

Severability

It is hereby declared to be the intention of the Board of Cameron County Irrigation District #2 that the sections paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase clause sentence, paragraph, or section of this Plan shall be declared unconstitutional by the judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan since the same would not have been enacted by the Board of Cameron County Irrigation District #2 without the

incorporation into this Plan of any such unconstitutional phrase clause, sentence, paragraph, or section.

Effective Date:

The effective date of the above shall be immediately upon its passage. Resolution is attached to the water conservation plan.

Appendix F
Letters of Project Support

East Rio Hondo Water Supply Corporation
206 Industrial Pkwy. * P.O. Box 621* Rio Hondo, Texas 78583*www.erhwsc.com*Phone (956) 748-3633 Fax 748-3179
"This institution is an equal opportunity provider and employer"

Cameron County Irrigation District #2
P. O. Box 687
San Benito, TX 78586

Subject: Support of Proposed Automated Gates Phase IV

Dear Mrs. Lambert,

This letter is in support of your WaterSMART application to the U.S. Bureau of Reclamation for granting funding of a water conservation initiative. As a rural water supplier in Cameron County Irrigation District #2's jurisdiction, East Rio Hondo Water Supply Corporation (ERHWSC) supports improving the efficiency of irrigation water delivery and reducing water loss by replacing open canals with pipelines and to automate gates at various locations. Any water conserved by the irrigation district directly benefits ERHWSC's future water supply and needs.

ERHWSC hereby supports your proposed efforts to change automated gates phase IV as a water conservation effort.

Sincerely,

Brian E. Macmanus, P.E.
General Manager

RGRWA
RIO GRANDE REGIONAL WATER AUTHORITY

Tuesday May 8, 2018

Ms. Sonia Lambert
General Manager
Cameron County Irrigation District #2
San Benito, TX 78586

Dear Ms. Lambert:

The Rio Grande Regional Water Authority was created by the Texas Legislature in 2003 as a conservation and reclamation district "to serve a public use and benefit" by bringing together regional water interests to accomplish projects and services within Willacy, Cameron, Hidalgo, Starr, Zapata, and Webb counties. Our mission is to enhance the capability of our primary water source – the Rio Grande – to serve our region well into the future.

The proposed project on the Automated Gates Phase IV --- 5 gates at various locations is a prime example of the improvements we endorse.

We happily support the efforts of the Cameron County Irrigation District #2 and your application to the Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant Program. Please contact me if we can be of assistance.

Sincerely,

Jim Darling

Jim Darling
President

Administrative Agent: Rio Grande Valley Partnership
P.O. Box 1499 • Weslaco, TX 78599
Telephone: (956) 968-3141 • Fax: (956) 968-0210

Appendix G
CCID2 Grant Application Board Resolution

CAMERON COUNTY IRRIGATION DISTRICT NO. TWO

26041 FM 510 P.O. BOX 687 SAN BENITO, TEXAS 78586
Phone (956) 399-2484 Fax (956) 399-4721
Sonia Lambert- General Manager

RESOLUTION

May 10, 2018
2018-006

Automated Gates – Phase IV
5 locations

APPLICANT'S NAME: Cameron County Irrigation District No. 2

WHEREAS, Cameron County Irrigation District No. 2 is an Irrigation District operating pursuant to Vernon's Texas Civil Statutes, Water Code, Chapter 58, and under Article XVI, Section 59, of the Texas Constitution; and

WHEREAS, the Cameron County Irrigation District No. 2, (District), is committed to water conservation, and;

WHEREAS, the District is seeking opportunities to implement projects that account for water use, and;

WHEREAS, Cameron County Irrigation District No. 2, San Benito, Texas, has identified a project that involves replacement of an open earthen canal to a pipeline.

WHEREAS, the District has sufficient resources to match available funds to complete such improvements;

NOW THEREFORE, BE IT RESOLVED that the Board of Directors of the Cameron County Irrigation District No. 2 agrees and authorizes that:

1. The Board authorizes its General Manager, Sonia Lambert, to submit an application for the WaterSMART Grant.
2. The Board or governing body has reviewed and supports the proposal submitted;
3. The applicant is capable of providing the amount of funding and/or in-kind contributions, specified in the funding plan; and
4. If selected, the applicant will work with Reclamation to meet established deadlines for entering into a cooperative agreement.

DATED: 5/9/18

Bill McMurray, President

ATTEST:

William Goad, Secretary

Appendix H
CCID2 Accounting Balance Sheet

FIRST COMMUNITY BANK
Other Banks Have Branches, We Have Roots.

CAMERON COUNTY IRRIGATION DIST 2
REHAB-ACCOUNT
PO BOX 687
SAN BENITO, TX 78586-0007

PERIODIC STATEMENT
Date: Mar 31, 2018
Period: Mar 01, 2018 to
Mar 31, 2018
(31 Days)

Please visit our web site at WWW.FCBWEB.NET
If you have any questions, please contact us at (956)399-3331.
For 24 hour banking Information, please call (888) 361-3661.

ACCOUNT #: DDA - 0000035378 Public Now-Analysis

Enclosures: 0

Beginning Balance as of 03/01/18	4,236.46
Deposits & Other Credits	2.86
Charges & Fees	0.00
Checks & Other Debits	0.00
Average Balance	4,236.46
Ending Balance as of 03/31/18	**4,239.32**

Transaction Information

Date	Check#	Description	Debit Amount	Credit Amount
03/31		Interest Credit		2.86

Daily Balance Information

Date	Balance	Date	Balance	Date	Balance
03/31	4,239.32				

FIRST COMMUNITY BANK
Other Banks Have Branches, We Have Roots.

CAMERON COUNTY IRRIGATION DIST 2
CANAL REHAB ACCOUNT
PO BOX 687
SAN BENITO, TX 78586-0007

PERIODIC STATEMENT
Date: Mar 31, 2018
Period: Mar 01, 2018 to
Mar 31, 2018
(31 Days)

Please visit our web site at WWW.FCBWEB.NET
If you have any questions, please contact us at (956)399-3331.
For 24 hour banking Information, please call (888) 361-3661.

ACCOUNT #: DDA - 0000036641 Public Now-Analysis

Enclosures: 0

Beginning Balance as of 03/01/18	119,071.55
Deposits & Other Credits	80.33
Charges & Fees	0.00
Checks & Other Debits	0.00
Average Balance	119,071.55
Ending Balance as of 03/31/18	**119,151.88**

Transaction Information

Date	Check#	Description	Debit Amount	Credit Amount
03/31		Interest Credit		80.33

Daily Balance Information

Date	Balance	Date	Balance	Date	Balance
03/31	119,151.88				

FIRST COMMUNITY BANK
Other Banks Have Branches, We Have Roots.

CAMERON COUNTY IRRIG DIST.2 WATER 2025
METERING PROJ AUTOMTC GATES 2ND
PO BOX 687
SAN BENITO, TX 78586-0007

PERIODIC STATEMENT
Date: Mar 31, 2018
Period: Mar 01, 2018 to Mar 31, 2018
(31 Days)

Please visit our web site at WWW.FCBWEB.NET
If you have any questions, please contact us at (956)399-3331.
For 24 hour banking Information, please call (888) 361-3661.

ACCOUNT #: DDA - 0000037222 Public Now-Analysis

Enclosures: 10

Beginning Balance as of 03/01/18	129,664.94
Deposits & Other Credits	61.44
Charges & Fees	0.00
Checks & Other Debits	63,125.34
Average Balance	92,373.21
Ending Balance as of 03/31/18	**66,601.04**

Transaction Information

Date	Check#	Description	Debit Amount	Credit Amount
03/12		Tfr to XXXXXX6158 IN KIND TRF PROJECT CA Cameron County Irrig	39,472.14	
03/31		Interest Credit		61.44

Check Information

Date	Check#	Amount	Date	Check#	Amount
03/14	1190	2,549.91	03/13	1195	311.15
03/14	1191	194.00	03/13	1196	172.49
03/14	1192	12,965.22	03/14	1197	753.00
03/15	1193	1,334.43	03/26	1198	4,188.00
03/14	1194	610.00	03/28	1199	575.00

FIRST COMMUNITY BANK
Other Banks Have Branches, We Have Roots.

Account #: DDA-0000037222

PERIODIC STATEMENT
CAMERON COUNTY
IRRIGATION DIST 2

Mar 31, 2018

Daily Balance Information

Date	Balance	Date	Balance	Date	Balance
03/12	90,192.80	03/15	71,302.60	03/31	66,601.04
03/13	89,709.16	03/26	67,114.60		
03/14	72,637.03	03/28	66,539.60		

CERTIFICATE	BR	NAME	CL	RSP	TYP	CURRENT BALANCE	CURRENT ACCRUED	RATE	MMIT	TERM	MATURITY DATE	ISSUED DATE
28732	07	CAMERON COUNTY IRRIGATION DISTRICT #2	08	PFA	516	3,574,365.34	7,834.23	1.0000	0	Q 12	05/10/18	11/10/15
							ORIGINAL AMOUNT:		3,500,000.00			

TOTALS FOR TYPE 516

NUMBER	PREVIOUS BALANCE	CURRENT BALANCE	CURRENT ACCRUED	WEIGHTED YIELD	ORIGINAL AMOUNT
1	3,574,365.34	3,574,365.34	7,834.23	1.0000W	3,500,000.00