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MAIN CANAL PIPE CONVERSION PROJECT, PHASE 1

WATER CONSERVATION THROUGH IMPROVED EFFICIENCY AND RELIABILITY

WaterSMART: Water and Energy Efficiency Grants for Fiscal Year 2019
Funding Opportunity BOR-DO-19-F004
Funding Group 1

Submitted by:
Vicente Ramirez, General Manager
March 19, 2019

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Executive Summary

Date: March 19, 2019
Applicant Name: Bayview Irrigation District #11
City, County, State: Bayview, Cameron, Texas

The Bayview Irrigation District #11 (BVID) is requesting 2019 WaterSMART: Water and Energy Efficiency Grant funds to improve water conservation, efficiency, and delivery reliability along the 6.88-mile (36,326 linear feet) BVID Main Canal located in eastern Cameron County, Texas. The grant project is Phase 1 of the Main Canal Pipeline Conversion, which will convert the first 2,550 linear feet of open canal to pipe, provide for education and outreach (including information on NRCS EQIP), and preparation to support the next phases. Pipe conversion is an important BMP. The expected total cost is up to $15,000,000 over 10-15 years, to be completed in phases as partnerships are developed and funds become available. Phase 1 is expected to conserve 120.85 acre/feet of water annually and will jumpstart this larger project and provide stimulus and matching funds to leverage for additional grants and investment. The BVID Main Canal conveys irrigation water from Cameron County Irrigation District #6 to a natural resaca in Bayview, TX which serves as the BVID reservoir. The Main Canal was constructed as a concrete-lined, open channel in 1929 and has deteriorated over the past 90 years. Converting the channel to pipe will reduce seepage, leakage, breaks, and evaporation to conserve water. It will also reduce concentrations of pollutants and salinity that reach agricultural fields. The project will take place entirely on land owned by the District and completion is expected within two years of the award agreement date. According to the 2016 Rio Grande Regional Water Plan, "Irrigation districts carry over eighty-five percent of the water that is used from the Rio Grande system in Region M." Significant population growth has put greater pressure on the limited water supply and a population increase of 142 percent is anticipated between 2010 and 2060. Water conservation must become a much larger factor in the future with agriculture and irrigation districts shouldering the majority of the burden. The proven conservation technologies in this project can result in a water savings of up to forty percent. The District will encourage landowners to install on-farm irrigation improvements for a greater conservation impact. The project will effectively manage water supplies, promote sustainability and water conservation, and give agricultural producers the reliability and enhanced feasibility they need to develop on-farm irrigation improvements. It will work in conjunction with successful Reclamation projects throughout Cameron County and the Lower Rio Grande Basin, particularly with the Cameron County Irrigation District #6 project funded in 2015. Quantifiable water conservation, reliable water management, community cooperation, and infrastructure modernization ensure that the project meets the priorities of the Department of the Interior, the Bureau of Reclamation, and the WaterSMART Program.

Background Data

History

Bayview Irrigation District #11 is a political subdivision of the State of Texas, originally created as Cameron County Water Improvement District #11 at an election on June 16, 1928, under Article 16, Section 59 of the TEXAS CONSTITUTION and statutes that are now codified in the Texas Water Code. The Texas Legislature ratified, confirmed, and validated the creation of the District by Acts 1929, 41st Leg., First C.S., General and Special Laws, Chapter 111, Page 268, effective May 22, 1929. The District was adjudicated lawfully created in Cause No. 8434, In Re: *Cameron County Water Improvement District Number Eleven in Cameron County, Texas*, in the 103rd District Court of Cameron County, Texas, on May 29, 1929, and in Cause No. 49,105, In Re: *Cameron County Water Improvement District Number Eleven in Cameron County, Texas*, in the 53rd District Court of Travis County, Texas, on October 11, 1930. Effective March 2, 1932, the District converted to a Water Control & Improvement District (Minutes of District for March 2, 1932 at pages 145-154), without change of name, but over time the District also became known as Cameron County Water Control & Improvement District #11. Effective November 29, 1982, by resolution duly adopted pursuant to Section 58.038 of the Texas Water Code, the District converted to an irrigation district operating under Chapter 58 of the Texas Water Code and changed its name to Bayview Irrigation District #11, Volume 12454, Pages 112- 115, Official Records of Cameron County, Texas. The District has no bonded indebtedness. Its TCEQ Customer Reference Number is: CN 600683073. The Main Canal is the primary conveyance between Cameron County Irrigation District #6 and the Bayview Irrigation District #11 reservoir. (The names of some districts in this discussion have changed over the past 90 years. Current names of districts are used here.) The developers of Bayview Citrus Groves Subdivision, Citrus Gardens Subdivision, and Harris Gentry Subdivision constructed the Main Canal. Construction was completed by December 1929. The owner of the land on which the Main Canal is situated between State Highway 100 and the east line of the Cole Tract conveyed a right-of-way for the Main Canal to Cameron County Irrigation District #6 on December 22, 1927. Cameron County Irrigation District #6 agreed to convey the right-of-way between State Highway 100 and the east line of the Cole Tract to the developers (however, the conveyance was not documented by instrument filed of record until 1964). The developer of Bayview Citrus Groves Subdivision caused the creation of Bayview Irrigation District #11 with the intention that the Bayview Irrigation District #11 would purchase the developer's irrigation works and interest in the Main Canal. Bayview Irrigation District #11 finalized the purchase of the Main Canal and irrigation works on June 12, 1929. Likewise, the developers of Citrus Gardens Subdivision and Harris Gentry Subdivision caused the creation of Cameron County Irrigation District #10 with the intention that District 10 would acquire their interests in the Main Canal. On July 28, 1932, Cameron County Irrigation District #10 and Bayview Irrigation District #11 executed a document declaring that the two districts jointly owned the Main Canal between Highway 100 and the common boundary of the two districts. On August 8, 1932, Cameron County Irrigation District #10 conveyed its half interest in the Main Canal to Bayview Irrigation District #11, reserving the right to use the Main Canal to transport its water.

The Main Canal conducts water from Cameron County Irrigation District #6 to the Bayview Irrigation District #11 reservoir in Bayview, TX. The Bayview Irrigation District #11 is located in

eastern Cameron County in the Lower Rio Grande Valley of South Texas and covers 6,850 acres, consisting primarily of agricultural land, ranches, and rural communities. The Rio Grande River is the only source of water for the District to divert for agricultural irrigation and domestic use within the its boundaries. The District's main reservoir includes a feeder resaca and a portion of the Resaca de los Cuates, with a capacity of 2,280 acre-feet. The reservoir assures a more reliable availability of water to meet the District's needs, considering the seven-day travel time from Falcon Reservoir. The resacas are filled through the Main Canal. The conversion of the Main Canal from open channel to pipe will provide a more reliable and efficient availability of water to the reservoir. The District currently serves 343 irrigation customers on 6,190 agricultural acres, diverts 45 acre-feet of domestic water annually for 110 users in the City of Bayview, and acts as a transport of water rights for a limited number of entities outside of the district.

This grant project is Phase 1 of a larger project. The intent of the larger project is to replace the **36,326** linear feet (**6.88 miles**) of the Main Canal's open channel with pipeline. Pipe conversion is an important BMP. The expected total cost is up to $15,000,000 over 10-15 years, to be completed in phases as partnerships are developed and funds become available. The larger project will efficiently conduct water from the end of the Cameron County Irrigation District #6 canal to the BVIDs reservoir in Bayview, TX. Phase 1 will jumpstart this larger project and provide stimulus and matching funds to leverage for additional grants and investment.

Phase 1 will convert the first **2,550** linear feet of open channel to pipe, from the end of the District #6 canal (as it crosses Highway 100 in Los Fresnos, TX) past the first turn in the system, north of Canal Street, to the crossing at Nogal Street. The project will include engineering designs and specifications, construction, educational outreach, and administration. Several partners are taking major and active roles in the project. The City of Los Fresnos is providing $150,000 in matching funds, and with that commitment the district has applied for a $150,000 grant from the Texas Water Development Board (TWDB). The Arroyo Colorado Watershed Partnership (ACWP), the Texas A&M AgriLife Extension Service (AgriLife), and the Texas Water Resources Institute (TWRI) will work with the District to provide outreach and education to a variety of stakeholders and decision-makers. Funds from the City of Los Fresnos and from the TWDB will be leveraged to obtain other grants and support from a variety of diverse conservation, health, recreation, and habitat sources to complete future phases of the larger 6.88-mile project. The BVID intends to leverage an award from the Bureau of Reclamation to complete future phases and complete the project.

The proposed activities will: improve management and conservation of water, reduce evaporation, reduce seepage loss, and lower operation and maintenance costs. Water from the Rio Grande is diverted at the Cameron County Irrigation District #6 main pumping station near San Pedro, TX. Water pumped from the river then flows approximately 19 miles to connect with the Bayview Irrigation District #11 Main Canal at Highway 100 in Los Fresnos, TX. The 6.88-mile Main Canal conducts water to the 2,280 acre-foot reservoirs in Bayview. From the reservoirs, the water distribution system consists of laterals, including approximately 22 miles of pipe installed in the 1930s, 5 miles of lined or partially lined canals, and 10 miles of unlined canal. The District's annual water diversion average from 2010 through 2017 was 4913.322 acre-feet. This

includes drought years of 2011, 2012, 2014, and 2017, along with the 2010 and 2015 years of plentiful rain. Estimated water delivery efficiency is approximately 60%.

Why is this important? Water quantities that seep through the bed and sides of the canal are significant. It is not uncommon to see transmission losses upwards of 40%. Transmission losses, which include seepage losses, leakage losses, operational losses, and evaporation losses, among others, depend on a number of factors. Some factors can be quantified. Seepage loss from canals is governed by hydraulic conductivity of the subsoils, canal geometry, and location of water table relative to the canal, among others. Canals are lined to control seepage, but canal lining deteriorates with time, and significant seepage losses continue to occur even from a lined canal. The Bayview Irrigation District #11's concrete-lined Main Canal was completed in **1929**. It has deteriorated over the past **90 years** and experiences transmission losses from all of the factors described above. Another factor in water loss is the theft of water in urban areas for watering lawns. An unknown number of municipal water users along the canal are using their own pumps to obtain the "free" water from the irrigation canal. Phase 1, located in the urban area of Los Fresnos, will stop some of this illicit water loss.

The grant project, which is Phase 1 of the Main Canal Pipe Conversion Project, is located at the beginning of the Bayview Irrigation District #11 Main Canal at Highway 100 in Los Fresnos, TX to the crossing at Nogal Street in Los Fresnos.

The Bayview Irrigation District #11 has not worked directly with the Bureau of Reclamation. The project will, however, strengthen the network of successful Reclamation projects throughout Cameron County, the Lower Rio Grande Valley, and the Lower Rio Grande Basin, as well as our partnership with Cameron County Irrigation District #6 from which we receive water from the Rio Grande River.

Potential Shortfalls in Supply

The population of the Lower Rio Grande Valley is one of the fastest-growing in the nation. Between 2000 and 2010, the population in the counties surrounding the Bayview Irrigation District #11 grew by twenty-three percent. Between 2010 and 2016 it grew an additional five percent. Water is one of the biggest concerns facing the region. Water availability affects health, economic development, and environmental issues and numerous entities and agencies are increasing their planning efforts to address future needs and solutions. The four-county area of the Valley is one of the most biologically diverse regions in the nation, including two major bird migration routes, endangered wildlife and plants, and numerous rare species that rely on the wetlands of the Rio Grande Delta that affect ecotourism and economic development. Irrigation Districts not only provide service to agriculture, but through conservation they can allocate water for municipal water supplies and other uses. As the demand for water increases, so does the responsibility of the Irrigation Districts and agricultural community to increase conservation efforts.

The 2016 Rio Grande Regional Water Plan for Region M shows that water demand is growing. Irrigation needs far exceed the supply of water available to meet them. In developing the plan, Black and Veatch worked with Texas A&M AgriLife Research to develop Irrigation District Conservation Water Management Strategies for all districts. Strategies include "Installation or replacement of pipeline" (Volume 1, pg. 5-3).

A variety of projects associated with Water Management Strategies have been recommended for the Bayview Irrigation District #11. They include: Canal Lining, Conveyance/Transmission Pipeline, Diversion and Control Structure, Meter Replacement, Water Loss Control, and On Farm Irrigation Conservation. (2016 Rio Grande Regional Water Plan for Region M, Volume II, page 181, Appendix Table "Recommended Projects Associated with Water Management Strategies")

The following tables from the 2016 Region M Regional Water Plan illustrate the increasing demand for municipal water while expecting decreases in agricultural water allocations. All water user groups rely on irrigation districts for the transportation of their water. The current infrastructure for irrigation districts throughout the region provides only about 60% efficiency, meaning a 40% water loss between pumping from Rio Grande River and delivery to the end user. Although new infrastructure such as pipeline conversion is expensive, conservation of that 40% irrigation district water loss is the most practical and expedient measure to ensure sufficient water supply for future generations of all water user groups.

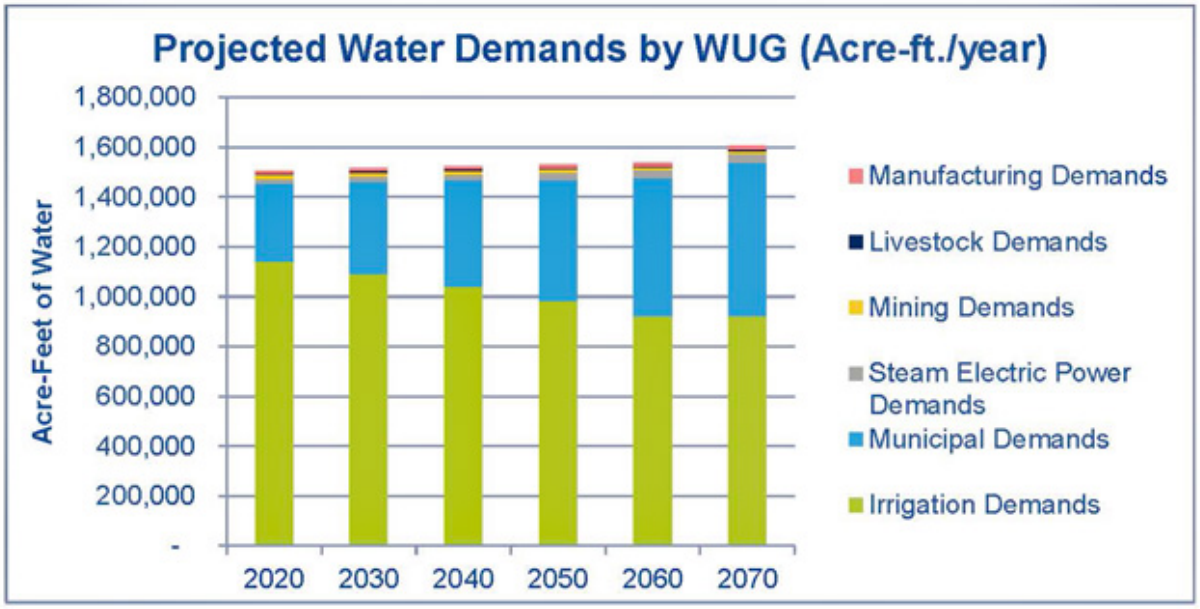

Figure 6 **Water demand projections for each water user group type in Region M (Acre-feet/year)**

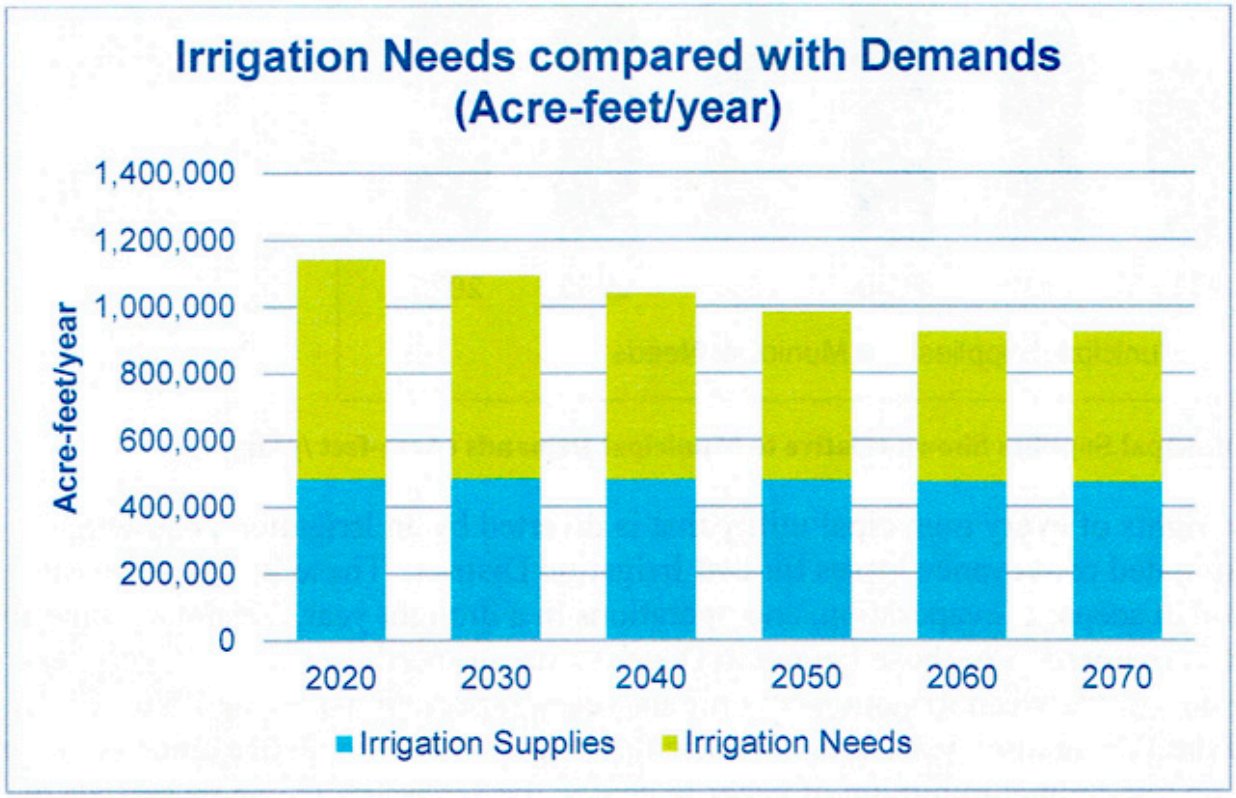

Figure 9 **Irrigation Supplies as a Portion of Irrigation Demands (Acre-feet /year)**

Table 6 Population, Demand, Supply, and Needs[7] for each WUG (Acre-feet /year)

Region M	2020	2030	2040	2050	2060	2070
MUNICIPAL						
POPULATION	1,799,926	2,194,660	2,587,179	2,980,668	3,372,124	3,752,822
DEMANDS (acre-ft./year)	289,511	344,462	400,547	458,649	518,212	576,729
EXISTING SUPPLIES (acre-ft./year)	288,986	289,059	289,132	289,201	289,233	289,233
NEEDS (acre-ft./year)	-38,425	-74,269	-117,948	-174,353	-233,168	-291,303
COUNTY-OTHER						
POPULATION	160,812	184,562	207,760	231,270	254,261	276,516
DEMANDS (acre-ft./year)	22,080	24,535	27,064	29,800	32,618	35,398
EXISTING SUPPLIES (acre-ft./year)	14,939	14,939	14,939	14,939	14,939	14,939
NEEDS (acre-ft./year)	-10,109	-12,124	-14,225	-16,481	-18,808	-21,107
MANUFACTURING						
DEMANDS (acre-ft./year)	10,433	11,292	12,147	12,898	13,896	14,971
EXISTING SUPPLIES (acre-ft./year)	7,904	7,904	7,904	7,904	7,904	7,904
NEEDS (acre-ft./year)	-2,529	-3,388	-4,243	-4,994	-5,992	-7,067
MINING						
DEMANDS (acre-ft./year)	17,051	16,480	14,952	12,823	10,458	10,361
EXISTING SUPPLIES (acre-ft./year)	12,099	12,098	12,068	12,044	12,019	12,002
NEEDS (acre-ft./year)	-5,290	-4,641	-5,488	-5,565	-5,758	-6,337
STEAM ELECTRIC POWER						
DEMANDS (acre-ft./year)	16,972	19,842	23,340	27,605	32,806	38,916
EXISTING SUPPLIES (acre-ft./year)	15,415	15,415	15,415	15,415	15,415	15,415
NEEDS (acre-ft./year)	-2,984	-5,635	-8,866	-12,805	-17,608	-23,501
LIVESTOCK						
DEMANDS (acre-ft./year)	4,986	4,986	4,986	4,986	4,986	4,986
EXISTING SUPPLIES (acre-ft./year)	9,625	9,625	9,625	9,625	9,625	9,625
NEEDS (acre-ft./year)	0	0	0	0	0	0
IRRIGATION						
DEMANDS (acre-ft./year)	1,144,135	1,093,749	1,040,789	983,283	924,558	924,558
EXISTING SUPPLIES (acre-ft./year)	486,490	485,574	484,164	483,717	482,530	481,912
NEEDS (acre-ft./year)	-658,049	-608,580	-557,158	-502,526	-447,439	-448,029
REGION TOTALS						
POPULATION	1,960,738	2,379,222	2,794,939	3,211,938	3,626,385	4,029,338
DEMANDS (acre-ft./year)	1,505,168	1,515,346	1,523,825	1,530,044	1,537,534	1,605,919
EXISTING SUPPLIES (acre-ft./year)	835,458	834,614	833,247	832,845	831,665	831,030
NEEDS (acre-ft./year)	-717,386	-708,637	-707,928	-716,724	-728,773	-797,344

Project Location

The Bayview Irrigation District #11's Main Canal Pipeline Conversion Phase 1 is located in Cameron County, Texas within the City of Los Fresnos. The Phase 1 project begins at (26.072347,-97.485078) and ends at (26.076024,-97.480772).

Maps
See attached maps (Appendix E), including:

- Area Map, including District boundaries (District circled) (from the 2016 Region M Regional Water Plan)
- District Map with Boundaries, includes location of the Main Canal and the project Phase 1 location (circled)
- Detail overview of Main Canal Pipe Conversion Project, with Phase 1 circled
- Detail overview of the project Phase 1 location.
- Maps of the Bayview Irrigation District #11
- Photographs of existing Main Canal showing project site, deterioration of Main Canal at project site (between irrigation deliveries), water theft from the project site, and an NRCS project currently under construction in the District.

Technical Project Description

The Bayview Irrigation District #11 Main Canal Pipe Conversion, Phase I, includes approximately **2,550** linear feet of pipeline conversion from the end of the Cameron County Irrigation District #6 canal at Highway 100 in Los Fresnos to the crossing of Nogal Street in Los Fresnos. The intent of the project is to replace the open channel with pipeline, add flow meters to measure losses, educate the agricultural community, and leverage BOR funds by preparing for future phases and finding additional funding. Goals of the project are water conservation, better water management, improved reliability in delivery of water to users, and enhanced feasibility for on-farm irrigation improvements. The anticipated water savings of the project is 120.85 acre/feet per year.

The Bayview Irrigation District #11 is ready to proceed with this project upon the award of a financial assistance agreement with the Bureau of Reclamation.

Tasks:
Survey/Engineering/Design is the first step in converting canals to pipeline. The District will contract with a qualified engineering firm through proper purchasing procedures. This will begin in month one of the project for the grant project area (Main Canal Pipe Conversion Project Phase 1). The Phase 1 project site has been surveyed by Moore Land Surveying and an Engineer Feasibility Study for the Phase 1 project is attached. Completion of the sealed plans and specifications for the grant project (Phase 1) is expected within six months of the grant start date.

Environmental Compliance and Permits. The project will be constructed in the footprint of the existing Main Canal. If the old channel is left open it becomes a site for illegal dumping. Any required local, state, or Federal permits will be obtained, but none are expected. Completion of this task is expected within six months of the award agreement.

Construction will be completed by contract. Through proper purchasing procedures, a construction contractor will be hired to provide materials and install the pipeline and other necessary elements for the grant project. The contractor will install the new 48" PVC pipeline parallel to the existing canal to allow the canal to stay in service throughout construction. The 48" diameter is necessary due to the 6.88-mile length of the larger project. After the pipeline is buried and backfilled, the banks of the existing canal and the spoils from installing the pipeline will be pushed into the existing canal in 12" lifts and compacted, then graded to leave the site level with existing ground. Concrete rip rap will be installed north of State Highway 100 in order transition from the canal to the new pipeline. A standpipe and concrete canasta will be constructed to transition the pipeline back to the canal. Construction will be complete within one and a half years of the grant start date.

Administration, Inspection, and Reporting will be performed by Bayview Irrigation District #11 staff, with assistance from the project engineer. It will continue throughout the grant period.

Education is a critical component to the success of any sustainable effort. This project includes educational elements directed toward District staff, the District's leadership, agricultural producers, college and university students, and the public. Partners in these efforts will include the Arroyo Colorado Watershed Partnership (ACWP), Texas A&M AgriLife Extension Service (AgriLife), and the Texas Water Resources Institute (TWRI). Please see the attached letter of support/commitment from ACWP Watershed Coordinator Jaime Flores. Educational tasks include:

1. A workshop for District staff and Board Members on water conservation strategies and technologies.
2. Information on agricultural water conservation will be hosted on the ACWP website, and links will connect users to water conservation and water quality sites such as TWDB, TCEQ, AgriLife, TWRI, and others. Results of this project will be disseminated through the website to agricultural producers, other stakeholders, and the public. Content will be developed by the District and our partners beginning in month 2 of the project. After approval by the TWDB, the content should be online as the ACWP redesigns its website with funding from the TCEQ.
3. The District will partner with ACWP, AgriLife and TWRI staff in Weslaco, TX to target the agricultural producer audience and to promote agricultural water conservation BMPs and participation in NRCS financial incentives programs. Mr. Victor Gutierrez is the TWRI Extension Assistant working on the project. He also participated in the development of the Irrigation Training Program Manual, funded by TWDB. He organizes, promotes, and participates in local workshops, field days, and meetings for agricultural producers. He encourages the use of fiscally and ecologically sound BMPs and engages producers in technical and financial assistance programs. Other helpful AgriLife resources include printed brochures and access to pioneering researchers in the field. Utilizing the capacity and resources of ACWP, AgriLife, and TWRI, the District will help to update a brochure and information for distribution to producers within the District and throughout the region. Through email and personal contact with producers, the District will promote

participation in AgriLife events and meetings. With our partners, the District will support agricultural Implementation Measures identified in the "Update to the Arroyo Colorado Watershed Protection Plan." This partnership will be an ongoing endeavor.

4. Ensuring that college and university students graduate with practical knowledge and experience, the District will host tours of the project for classes. These field trips will take place during and after pipe installation. Students that may participate include those in engineering, natural sciences, and hydrology majors.
5. Staff and leadership from other Irrigation Districts, agricultural producers, students, state agencies such as TWDB and TCEQ, conservation organizations, municipalities, and others will be invited to a workshop on conservation strategies and benefits. The District will work with ACWP, AgriLife, and TWRI to host this workshop.

Leverage Bureau of Reclamation funds by seeking partnerships and funding for the next phases of the 6.88-mile project for the continuation and sustainability of the Bureau of Reclamation Phase 1 project.

Monitoring and Recordkeeping. Operational effectiveness will be measured after the project is constructed to verify water savings. This task will be ongoing.

Reporting to Bureau of Reclamation. The District will prepare reports as required for submittal to the Bureau of Reclamation. This task will be ongoing.

The grant project will produce a 2,550 linear-foot pipeline in Phase 1 of the larger project, and will be leveraged to obtain additional grants, loans, and partnerships to complete the larger 6.88-mile canal-to-pipe conversion. Additional deliverables include sealed engineering plans and specifications, water conservation data, water conservation workshop templates and materials, a water conservation field trip template and materials, progress reports as required, and a final report.

Evaluation Criteria

Evaluation Criterion A – Quantifiable Water Savings

Quantifiable water savings will result from pipeline conversion infrastructure improvements included in the project.

The Bayview Irrigation District #11's annual water diversion average from 2010 through 2017 was 4913.322 acre-feet. This includes drought years of 2011, 2012, 2014, and 2017, along with the 2010 and 2015 years of plentiful rain. The District reported estimated water delivery efficiency of approximately 60%.

From an AgriLife Extension Texas A&M System study, “Measuring Seepage Losses from Canals Using the Ponding Test Method”, the AgriLife Extension service has measured seepage loss rates ranging from 23 to 1,690 acre-feet per mile (per year), for lined and unlined canals, in the Lower Rio Grande Valley of Texas.

Table 1. Results of canal seepage loss tests in the Lower Rio Grande River Basin.

Test ID	Width (ft)	Depth (ft)	Loss rate	
			gal/ft²/day	ac-ft/mi/yr
Lined				
LF1	12	5	1.77	152.9
LF2	10	6	4.61	369.1
MA4	12	5	8.85	529.7
SJ4	15	4	1.17	111.2
SJ5	14	5	1.38	145.5
UN1	12	6	2.32	217.7
UN2	8	3	2.09	121.2

1) 1

From “Measuring Seepage Losses from Canals Using the Ponding Test Method” by the AgriLIFE Extension Texas A&M Systems, BY Eric Leigh and Guy Fipps.

Average seepage rate from Table 1 is 235.30 acre-ft/mile/year.

From another Texas A&M AgriLife Experiment called “Ponding Test Results; Seepage and Total Losses; Main Canal B, Hidalgo County Irrigation District No. 16”, by Eric Leigh and Guy Fipps, Dated Feb. 17, 2004, the following table was extracted:

Table 8. Results of total loss tests in lined canals (leaking gates and valves may have contributed to measured loss rates) conducted by Texas Cooperative Extension in the Lower Rio Grande River Basin.

Test ID	Year	Canal Width (ft)	Canal Depth (ft)	Class	Loss Rate	
					gal/ft2/day	ac-ft/mi/yr
Lined						
16HC1	03	14	5	M	1.89	192.4
BV1	99	10	5	M	7.97	510.5
BV2	99	9	4	M	8.53	451.5
DL1	00	20	6	M	0.16	18.8
DL2	00	7	4	S	4.12	236.2
DO1	03	5	3	S	1.68	65.2
DO2	03	6	4	S	2.18	121.5
DO3	03	6	3	S	2.71	107.2
ED1	00	6	4	S	34.32	1519.6
ED2	00	6	4	S	21.5	858.2
ED3	00	3	2	T	10.22	308.2
ED4	00	4	3	S	18.72	567.7
ED6	99	9	4	M	8.53	451.5
HA2	00	10	4	M	2.26	135.2
HA3	98	15	2	S	0.64	45.5
ME1	98	38	7	M	1.26	281.9
ME2	98		4	M	1.88	163.5
SJ1	99	12	5	M	2.58	126.8
SJ6	03	12	3	M	1.88	1.63
SJ7	03	19	4	M	1.98	227.1
UN3	02	12	6	M	2.02	154.3

Classification of canal: M = main, S = secondary, T = tertiary

The average seepage loss rate for the above tests is 311.62 ac.ft/mi/yr.

Another study was conducted in on a portion of a local canal. The Texas A&M AgriLIFE publication "Canal Ponding Test Results, Delta Lake Irrigation District, Edcouch, TX", prepared by Guy Fipps, Ph.D, PE, and Eric Leigh in July 2000 included the following table. The publication can be found in Appendix G.

Table 1. Ponding Test Results for Delta Lake Irrigation District

Test	Segments	Canal Type	Soil Type	Canal[1] Rating	Top Width (ft)	Length (ft)	Seepage Rate (gal/ft²/day)	Total Loss in Canal (ac-ft/mile) per day	per year[2]
1	A & A-12	lined	fine sandy loam	6.1	18	11405	3.63	0.98	293.79
2	A-11	lined	fine sandy loam	4.9	6	2552	5.32	1.03	308.55

[1] on a scale of 10 to 1.
[2] based on 300 days of operation per year.

The average seepage loss rate for the above tests in concrete lined canals is 301.17 ac.ft/mi/yr.

From the Texas Water Development Board, Bayview Irrigation District #11 is located in quadrant 1110, which underwent an evaporation loss rate of 63.66 in/yr in 2017. An average of the annual evaporation over ten years from 2008 to 2017 yields an average annual loss of 61.24 in/yr.

Table 2		
Water Conservation Estimate – Phase 1 Only		
Approx. Total Combined Length	2,550.00	ft
Approx. Surface Area	1.17	acres
Avg. Top Width	20.00	ft
Avg. Depth	3.50	ft
Seepage Rate for Concrete Lined [2]	235.30	ac.ft/mi/yr
Estimated Seepage Loss	113.64	ac.ft/yr
2017 Evaporation Rate for TWDB quadrant 1110	63.66	in/yr
Estimated Evaporation Loss	6.21	ac.ft/yr
Estimated Theft Loss	1.00	ac.ft/yr
TOTAL WATER CONSERVATION ESTIMATE	**120.85**	ac.ft/yr

Seepage rate from average of values calculated by "Measuring Seepage Losses from Canals Using the Ponding Test Method" by the AgriLIFE Extension Texas A&M Systems, for concrete lined canals (Table 1). The more conservative of the two averages was used.

It is unknown how much water is lost through theft by landowners and homeowners along the canal. It is estimated that a minimum of one acre/foot per year is lost annually from the Phase 1 project area.

Additionally, bank failures have occurred repeatedly due to nutria, aging infrastructure, and other factors. It is not uncommon for the district to lose several acre-feet during a small bank failure. Failure losses are usually minimized by quick reporting by farmers, ranchers, and staff. Conversion of open canals to pipeline would mitigate the great majority of these losses.

At current values of $26/acre-foot of single usage water, the savings for Phase 1 of the larger project in the first year would be $3,142.36. Assuming a minimum life of 50 years for this project, the proposed improvements have the potential of saving roughly $157,118. The true value in funding Phase 1 of the larger project is kickstarting a 6.88-mile pipe conversion and providing funds that will be leveraged to obtain additional grants and partnerships. Assuming water costs will continue to increase, the actual savings should be significantly higher.

Upon completion of proposed improvements, the district will verify water savings by installing flow metering devices at the ends of the pipeline. Mitigated water losses will be determined by subtracting the delivered volume from the influent volume. Another way the district may verify water savings, would be by performing a ponding test on the stand pipe connected to the system, which would accurately measure water loss in the system.

Bayview Irrigation District #11 intends to use 48"PRO-21 PVC pipe. The Specification Data and Loading Chart for this product can be found in Appendix H.

Evaluation Criterion B – Water Supply Reliability

In the 1920s, as agricultural producers were lured to this subtropical area from farming communities to the north, the Lower Rio Grande Valley of South Texas was known as the "Magic Valley." The fertile soils of the Rio Grande River Delta make this an especially productive area for fruits, vegetables, row crops, livestock, and specialties like sugar cane. The limiting factor has always been water availability and reliability.

- According to the 2016 Rio Grande Regional Water Plan, "Irrigation districts carry over eighty-five percent of the water that is used from the Rio Grande system in Region M." The Plan shows a population growth in the region of 142 percent between 2010 and 2060, most of which will take place in Hidalgo and Cameron Counties. The Bayview Irrigation District #11 is located in Cameron County. Significant population growth in the past has already put greater pressure on the limited water supply, most of which is transmitted by irrigation districts through open channels. Water conservation must become a much larger factor in the future. The Plan shows how irrigation districts and agriculture will shoulder over fifty percent of this burden.

- The Lower Rio Grande Basin Study, funded by the Bureau of Reclamation, states that "the magnitude and frequency of water supply shortages within the study area are severe" with an expected annual shortfall of 592,000 acre-feet by 2060, "about thirty-five percent of the total water demand." It notes that climate change may increase that shortage by an additional 86,438 acre-feet per year by that time. Shortfalls will affect over $250 million in agricultural production, and it will hit municipal and industrial users and the unique wildlife of the area, including sixty-nine rare, threatened, or endangered species.

- Conserved water will be used to address shortages that reduce deliveries. The Bayview Irrigation District #11 is at the end of the irrigation system and shortages are common due to seepage, evaporation, and theft. All the conserved water will be utilized for this purpose, an estimated 120.86 acre-feet annually. Eventually, much of the water conserved by the agriculture community will be used for municipal purposes as the population continues to grow rapidly.

- Water from the Main Canal is stored in the feeder resaca and the Resaca de los Cuates in Bayview, TX. Resacas provide multiple benefits to multiple sectors and users, including providing water to homeowners for domestic use in the Bayview community, providing habitat for rare and endangered species, providing water-based and wildlife-based recreation, and promoting ecotourism.

- The Lower Rio Grande Valley is one of the most biodiverse areas in the United States and ecotourism contributes over $463 million annually to the local economy. Water savings will protect water allocation for local habitats and benefit a variety of rare, threatened, endangered, and economically important species, such as sea turtles and piping plovers. The project will reduce the concentration of pollutants, to protect surface water quality for habitat, wildlife, and ecotourists. The area is the focal point for two of the four major bird migration flyways in the Western Hemisphere, the wintering site for hundreds of thousands of waterfowl, and a harbor for dozens of tropical species which cannot be seen elsewhere in the United States. Species found on nearby Laguna Atascosa National Wildlife Refuge and tracts of the Lower Rio Grande Valley National Wildlife Refuge include: Ocelot, Peregrine Falcon, Northern Aplomado Falcon, and other rare and endangered species. Any conserved water that remains in the Rio Grande River will provide habitat for wildlife and flow to the Gulf of Mexico. This project will provide great benefit to these species that are found in and around the Bayview Irrigation District #11.

- The Bayview Irrigation District #11 is a partner in local planning efforts and outreach. The project addresses the water reliability, water shortfalls, and increased demand outlined in the 2016 Rio Grande Regional Water Plan and the Lower Rio Grande Basin Study.

- The Bayview Irrigation District #11 is located in rural parts of Cameron County. According to the U.S. Census Bureau (2016 American Community Survey) in Cameron County, 33.0% of the population lives below the Federal poverty level. The project will benefit these rural and economically disadvantaged communities.

- There are no tribes that will benefit from this project.

- The Main Canal Pipe Conversion Project has widespread support (see Appendix A - Letters of Support and Appendix C - Letters Regarding NRCS Technical or Financial Assistance) from agricultural producers, water planning agencies, local leaders, other water supply entities, and agricultural education/research providers, among others. Support includes

$150,000 from the City of Los Fresnos. The city will build a community trail above the buried pipeline and maintain the trail. We have applied for a $150,000 Agricultural Water Conservation Grant from the Texas Water Development Board and expect an award announcement in April 2019. We will also work with leaders throughout the region to combine efforts to conserve water. An enclosed water delivery system makes on-farm irrigation improvements feasible and cost-effective, reduces the potential for catastrophic failures that result in a discontinuity of service, and provides a foundation for long-term management and water conservation. It will enhance the effectiveness of outreach efforts to promote on-farm irrigation improvements to conserve water, improve productivity, and protect water quality.

- The project will enhance the feasibility of NRCS EQIP assistance to landowners to make water conservation improvements on their own agricultural land. It will also encourage additional water conservation participation by Cameron County Irrigation Districts #6 and #10 and landowners within those districts. We will work with the AgriLife Extension Service and NRCS to inform farmers and ranchers of NRCS opportunities.

- In the past, drought, theft, and other factors have caused crisis for the water users of the Bayview Irrigation District #11, and our partners within the system, Cameron County Irrigation Districts #6 and #10. The Main Canal Pipe Conversion Project and the water available through conservation will ease these crises and the tensions they cause.

- The Bayview Irrigation District #11 will work with numerous partners. Education and outreach will be accomplished through our partnership with the ACWP, AgriLife, and TWRI. The City of Los Fresnos will partner on conservation and the development of a community recreational trail over the buried pipe. The TWDB will partner with us on conservation.

- With reduced evaporation and seepage, salinity and the concentration of other pollutants reaching agricultural fields will be reduced.

In accordance with Section 9504(a)(3)(B) of P.L. 111-11, the Bayview Irrigation District #11 will not use any associated water savings to increase the total irrigated acreage of the applicant or to otherwise increase the consumptive use of water in the operation of the District.

Evaluation Criterion C – Implementing Hydropower

Not applicable. This project phase will have no power requirements and the use of hydropower is not required.

Evaluation Criterion D – Complementing On-Farm Irrigation Improvements

In 2012, the Texas Water Resources Institute (TWRI) received a $2,964,000, five-year Regional Conservation Partnership Program (RCPP) Grant from the NRCS to encourage and support on-farm irrigation improvements eligible for NRCS technical and financial assistance in the Lower Rio Grande Valley of South Texas (HUCs 12110208 and 13090002) (see attached letter, Appendix C). Project partners, including the AgriLife Extension Service and the NRCS, promote practices associated with irrigation water management, irrigation systems, land leveling, irrigation pipeline and other NRCS-eligible on-farm irrigation improvements. Since 2016, 41 participants in the Cameron-Willacy-Hidalgo County area have contracted received NRCS assistance (see attached Gutierrez email, Appendix C). This is our baseline for understanding the impact that the Bayview Irrigation District #11 education and outreach will have in partnership with TWRI, AgriLife, ACWP and NRCS.

Producer Stephen Reynolds has completed a pipeline project with the NRCS (see attached letter, Appendix C). Since the development of this grant application, two additional producers, Ernesto Martinez and Gilberto Hernandez, have contacted NRCS Conservationist, Deanna Gutierrez in San Benito, TX and begun the application process (see attached letters, Appendix C).

The enclosed and reliable water delivery system provided by the pipeline conversion will facilitate additional eligible on-farm improvements in the future, making them more feasible and effective to conserve hundreds of acre-feet of water annually in addition to the conservation achieved by the Main Canal Pipeline Conversion Project. The pipeline and flow meters will ensure that a reliable amount of water will be delivered, without seepage and evaporation losses and without illicit diversion. Due to the Main Canal project, TWRI will target the Bayview Irrigation District #11 area for future educational programs, technical support, and financial assistance from NRCS through the RCPP grant, the Environmental Quality Incentives Program (EQIP), or similar programs.

Please see Appendix C – Letters Regarding NRCS Technical or Financial Assistance.

Evaluation Criterion E – Department of the Interior Priorities

Creating a conservation stewardship legacy second only to Teddy Roosevelt is a significant aspiration, but the Bayview Irrigation District #11 and this project support this priority. As a partner in local water planning and outreach efforts, the District utilizes science-based best management practices (BMPs) to conserve water and provide the best service to water users in the area. Those BMPs include the pipeline conversion and flow measurement that comprise the Main Canal Pipeline Conversion Project. In the development of the 2016 Rio Grande Regional Water Plan, the Lower Rio Grande Basin Study, the Arroyo Colorado Watershed Protection Plan, and the District's own planning efforts, a variety of tools and resources are used, and plans address issues that will impact water demand and water conservation in the future. These include: current and future land use planning and land use designations, environmental and

regulatory review and the maintenance of environmental standards, the identification of opportunities to resolve conflicts and expand capacity, and fostering relationships with conservation organizations and other partners which may have opposing viewpoints but common goals.

A project facilitated by Phase 1 of the Main Canal Pipeline Conversion is the City of Los Fresnos community trail. The city has secured funds to develop a 3.5-mile loop trail around the heart of downtown. It will follow the Main Canal from the beginning of Phase 1 at Highway 100, incorporate all of Phase 1, and continue to the Cameron County Drainage District #1's ditch. The trail will connect schools, parks, neighborhoods, businesses and more. It will allow public access to the main canal corridor to expand recreational opportunities. The Bayview Irrigation District #11 plans to incorporate this trail along the entire 6.88 miles of the total project.

The Bayview Irrigation District #11 has a philosophy of community and neighbors helping neighbors. This project helps to strengthen trust and collaboration with local communities. Working with our partners at TWRI and the NRCS, the Main Canal project will help landowners and agricultural producers develop on-farm irrigation improvements that will conserve water and private fiscal resources, increase productivity, and protect surface water resources from excessive agricultural runoff and other pollutants. The ACWP developed the recent Update to the Arroyo Colorado Watershed Protection Plan, which was accepted by the US EPA in 2017. This project will complement the implementation of management measures outlined in the plan.

As a partner in planning efforts, the District has regular communication with local, state and Federal natural resource offices, the Texas Water Development Board, the Texas Soil and Water Conservation Board, the U.S. Fish and Wildlife Service (Laguna Atascosa National Wildlife Refuge), Texas Parks and Wildlife, county commissioners, local leaders and communities, and state and Federal legislators and other leaders. This project, and the partnerships involved, will help facilitate and expand future communications and outreach efforts.

This project will modernize the infrastructure of the Main Canal and enhance the feasibility of infrastructure improvements on private land. Partnerships include those with the City of Los Fresnos, TWDB, TWRI, AgriLife, and ACWP. The ACWP is a partnership of over 400 stakeholders, both public and private, within and near the Arroyo Colorado Watershed. The project is part of a larger plan to modernize the infrastructure throughout the District to provide for greater water conservation and more reliable water delivery.

Evaluation Criterion F – Implementation and Results

Subcriterion F.1 – Project Planning

The Bayview Irrigation District #11 has a Water Conservation Policy and a Drought Contingency Policy (See Appendix F for both). These plans have been developed with the Texas Commission on Environmental Quality (TCEQ) and the Region M Regional Water Plan to ensure that water in the District is used efficiently and effectively, especially in times of drought.

In addition, the District is working on planning efforts for capital improvements and other projects to be included in the update of the Rio Grande Regional Water Plan. Resources used in District planning efforts include the 2016 Rio Grande Regional Water Plan, the Lower Rio Grande Basin Study, the agricultural outreach implementation measures from the Arroyo Colorado Watershed Protection Plan, and other state and regional plans and tools.

Pipeline conversion is a high priority for the District because of the great potential for water savings, efficiency, and improved maintenance scheduling. The Main Canal Pipe Conversion Project ranks highest in the District's planning efforts because of these priorities. We have developed preliminary designs, studies, surveys, cost estimates, and benefit estimates for the project. The project implements objectives of regional and state plans, as well as the District's plans.

Please see Appendix F for copies of the district's Water Conservation Policy and a Drought Contingency Policy.

Please see Appendix E – Maps and Photos which includes maps, plans, and photos of the proposed project.

Subcriterion F.2 – Performance Measures

Performance Measure 1 – Pipeline Installation

A milestone in the project, and a measure of performance, will be the completion of the installation of the 2,550 l.f. pipeline project, including standpipe, canastas, and micrometer flow meters.

Performance Measure 2 – Quantifiable Water Savings

Using standard rates of seepage and evaporation as a baseline, future water conservation will be accurately measured to determine the quantifiable water savings from the pipeline conversion. Micrometer flow meters will be installed at each end of the project pipeline for accurate measurements. This enclosed, charged, on-demand system will provide an estimated 120.85 acre-feet per year in quantifiable water savings.

Performance Measure 3 – Increase in eligible on-farm irrigation improvement applications for NRCS technical and financial assistance.

Working with TWRI, AgriLife, ACWP, and NRCS to promote these programs to local agricultural producers, our partners will keep records of the number of applications from the area and the number of projects receiving assistance. A 3-year baseline has been provided by the local NRCS Conservationist of NRCS contracts awarded in Cameron, Hidalgo, and Willacy Counties (See Appendix C).

Subcriterion F.3 – Readiness to Proceed

The Bayview Irrigation District #11 is prepared to proceed immediately upon award of funds.

An Engineer's Feasibility Report has been done for the entire 6.88-mile Main Canal Pipe Conversion Project (see Appendix D).

IMPLEMENTATION AND SCHEDULE

Survey/Engineering/Design is the first step in converting canals to pipeline. The District will contract with a qualified engineering firm through proper purchasing procedures. This will begin in month one of the project for the grant project area (Main Canal Pipe Conversion Project Phase 1). The Phase 1 project site has been surveyed by Moore Land Surveying and an Engineer Feasibility Study for the Phase 1 project is attached. Completion of the sealed plans and specifications for the grant project (Phase 1) is expected within six months of the grant start date.

Environmental Compliance and Permits. The project will be constructed in the footprint of the existing Main Canal. If the old channel is left open it becomes a site for illegal dumping. Any required local, state, or Federal permits will be obtained, but none are expected. The District has not discussed this with the local Reclamation office, but will do so within one month of any award. Completion of this task is expected within six months of the award agreement.

Construction will be completed by contract. Through proper purchasing procedures, a construction contractor will be hired to provide materials and install the pipeline and other necessary elements for the grant project. The contractor will install the new 48" PVC pipeline parallel to the existing canal to allow the canal to stay in service throughout construction. The 48" diameter is necessary due to the 6.88-mile length of the larger project. After the pipeline is buried and backfilled, the banks of the existing canal and the spoils from installing the pipeline will be pushed into the existing canal in 12" lifts and compacted, then graded to leave the site level with existing ground. Concrete rip rap will be installed north of State Highway 100 in order transition from the canal to the new pipeline. A standpipe and concrete canasta will be constructed to transition the pipeline back to the canal. Construction will be complete within one and a half years of the grant start date.

Administration, Inspection, and Reporting will be performed by Bayview Irrigation District #11 staff, with assistance from the project engineer. It will continue throughout the grant period.

Education is a critical component to the success of any sustainable effort. This project includes educational elements directed toward District staff, the District's leadership, agricultural producers, college and university students, and the public. Partners in these efforts will include the Arroyo Colorado Watershed Partnership (ACWP), Texas A&M AgriLife Extension Service (AgriLife), and the Texas Water Resources Institute (TWRI). Please see the attached letter of support/commitment from ACWP Watershed Coordinator Jaime Flores. Educational tasks include:

1. A workshop for District staff and Board Members on water conservation strategies and technologies.

2. Information on agricultural water conservation will be hosted on the ACWP website, and links will connect users to water conservation and water quality sites such as TWDB, TCEQ, AgriLife, TWRI, and others. Results of this project will be disseminated through the website to agricultural producers, other stakeholders, and the public. Content will be developed by the District and our partners beginning in month 2 of the project. After approval by the TWDB, the content should be online as the ACWP redesigns its website with funding from the TCEQ.
3. The District will partner with ACWP, AgriLife and TWRI staff in Weslaco, TX to target the agricultural producer audience and to promote agricultural water conservation BMPs and participation in NRCS financial incentives programs. Mr. Victor Gutierrez is the TWRI Extension Assistant working on the project. He also participated in the development of the Irrigation Training Program Manual, funded by TWDB. He organizes, promotes, and participates in local workshops, field days, and meetings for agricultural producers. He encourages the use of fiscally and ecologically sound BMPs and engages producers in technical and financial assistance programs. Other helpful AgriLife resources include printed brochures and access to pioneering researchers in the field. Utilizing the capacity and resources of ACWP, AgriLife, and TWRI, the District will help to update a brochure and information for distribution to producers within the District and throughout the region. Through email and personal contact with producers, the District will promote participation in AgriLife events and meetings. With our partners, the District will support agricultural Implementation Measures identified in the "Update to the Arroyo Colorado Watershed Protection Plan." This partnership will be an ongoing endeavor.
4. Ensuring that college and university students graduate with practical knowledge and experience, the District will host tours of the project for classes. These field trips will take place during and after pipe installation. Students that may participate include those in engineering, natural sciences, and hydrology majors.
5. Staff and leadership from other Irrigation Districts, agricultural producers, students, state agencies such as TWDB and TCEQ, conservation organizations, municipalities, and others will be invited to a workshop on conservation strategies and benefits. The District will work with ACWP, AgriLife, and TWRI to host this workshop.

Leverage Bureau of Reclamation funds by seeking partnerships and funding for the next phases of the 6.88-mile project for the continuation and sustainability of the Bureau of Reclamation Phase 1 project.

Monitoring and Recordkeeping. Operational effectiveness will be measured after the project is constructed to verify water savings. This task will be ongoing.

Reporting to Bureau of Reclamation. The District will prepare reports as required for submittal to the Bureau of Reclamation. This task will be ongoing.

Evaluation Criterion G – Nexus to Reclamation Project Activities

The Bureau of Reclamation has participated in and funded numerous water and energy conservation projects across the Lower Rio Grande Valley of South Texas and the Lower Rio Grande Basin. The Cameron County Irrigation District #6 provides water to the Bayview Irrigation District #11 from the Rio Grande River. District #6 received a Water and Energy Efficiency Grant in 2015, which they have successfully completed, and which affects the Bayview project. Numerous other local irrigation districts, municipalities, water providers, and others have successfully completed important projects with Reclamation assistance.

The Bayview Irrigation District #11 Main Canal Pipe Conversion Project, Phase 1, will contribute water savings to the Lower Rio Grande Basin in combination with many past successful Reclamation projects.

Evaluation Criterion H – Additional Non-Federal Funding

The District is proposing a project with a budget of $605,675.60. We are requesting Federal funds from the Bureau of Reclamation WaterSMART Program of $300,000.00. The remainder, $305,675.60 along with any overruns, will be provided by the Bayview Irrigation District #11 and our partners.

The total non-Federal funding will account for 50.5% of the project.

Project Budget

Funding Plan and Letters of Commitment

Letters of commitment are attached in Appendix A.

The Bayview Irrigation District #11 plans to fund the Non-Federal portion of the project, along with any cost overruns that may occur, through our partnership with the City of Los Fresnos, a grant application to the Texas Water Development Board (TWDB) Agricultural Water Conservation Program, and in-kind contributions from the District. Any cost overruns will be covered by the District.

The City of Los Fresnos has committed $150,000 to the project and the funds are available immediately without contingencies.

The TWDB anticipates awarding Agricultural Water Conservation grants in April. At that time, we will notify the Bureau of Reclamation of their decision. If funding is not approved, the project will be scaled down to a project that includes $150,000 from Los Fresnos, $5,675.60 in-kind from

the Bayview Irrigation District #11, and a $155,675.60 grant from the Bureau of Reclamation Water and Energy Efficiency Grant, for a project total of $311,400. That amount will create a 1,350 l.f. pipeline to reach from Highway 100 north to the turn in the canal in the Phase 1 project site. Education will be scaled back.

No costs have been or will be incurred prior to award.

Budget Proposal

Table 1 - Total Project Cost Table	
SOURCE	**AMOUNT**
Costs to be reimbursed with the requested Federal funding	$ 300,000.00
Costs to be paid by the applicant	$ 5,675.60
Value of third party contributions	
City of Los Fresnos	$ 150,000.00
Texas Water Development Board	$ 150,000.00
TOTAL PROJECT COST	$ 605,675.60

Table 2 - Budget Proposal				
BUDGET ITEM DESCRIPTION	**COMPUTATION**		**Quality**	**TOTAL**
	$/unit	**Quantity**	**Type**	**COST**
Salaries and Wages				
General Manager	$ 28.85	120	hours	$ 3,462.00
Secretary	$ 11.00	80	hours	$ 880.00
Equipment				
Pick Up Truck	$ 16.67	80	hours	$ 1,333.60
Contractual/Construction				
Engineering, Surveying, Admin.	$ 45,000.00	1	each	$ 45,000.00
Construction	$ 495,750.00	1	each	$ 495,750.00
Other				
Contingency	$ 24,787.50	1		$ 24,787.50
Education & Outreach	$ 15,000.00	2	year	$ 30,000.00
Leverage grant for additional funds	$ 4,462.50	1	year	$ 4,462.50
Total Direct Costs				**$ 605,675.60**

Budget Narrative

The Bayview Irrigation District #11 is requesting $300,000 and will match that with $150,000 that has been budgeted for the project by the City of Los Fresnos and a $150,000 grant application to the Texas Water Development Board, along with $5,675.60 in staff time and equipment use from the Bayview Irrigation District #11. The funding is needed to conserve water Phase 1, enhance awareness of water conservation BMPs and the NRCS incentives for landowners to put them into practice, and to initiate the larger 6.88-mile pipe conversion of the Main Canal.

Salaries and Wages
The program manager for the project is Bayview Irrigation District #11 General Manager Vicente Ramirez. Mr. Ramirez receives a salary of $60,000/yr, equivalent to approximately $28.85/hr. It is estimated that the two-year project will require 120 hours of his time for project management.

District Secretary Lisa Leos will assist with recordkeeping, communications, and other administrative duties for the project. Ms. Leos receives $11.00/hour and it is estimated that the project will require 80 hours of her time.

Fringe Benefits - NA

Travel - NA

Equipment
The District will be utilizing its own 1-ton diesel pick-up truck for use by the General Manager to inspect progress on the project (1 hr./ day for 16 weeks of project time at $16.67/hr.). The USACE usage rates were used from their Construction Equipment Ownership and Operating Expense Schedule. No exact matches were found, so rates for comparable units were used.

Materials and Supplies
All materials and supplies will be purchased and installed by the contractor. They will include 2,550 feet of 48” PRO-21 PVC pipe (or equivalent), a 48” standpipe, two concrete canastas, and two micrometer flow meters.

Contractual
Contractual costs include the professional services of a qualified engineering firm to include surveying the project area, engineering services, construction plans and specifications, assistance with the procurement process to purchase supplies and materials, and support during construction. $30,000 will be used for Phase 1 and an additional $15,000 will be used to survey and design Phase 2 so that Bureau of Reclamation funds can be easily leveraged to continue the larger project and for sustainability of the project.

Contractual costs include the services of a construction firm to purchase materials and construct the project.

Third-Party Contributions – NA

Other Costs
A contingency line of approximately five percent of the construction has been added in case of rising material prices or other unforeseen expense.

Education & Outreach partners include TWRI, AgriLife, and ACWP. Funds will be used to cover expenses incurred in education and outreach programs.

The Bayview Irrigation District #11 will work with partners, engineers, and grant writers to leverage any Bureau of Reclamation grant award for additional funds for future phases of pipe conversion on the 6.88-mile Main Canal. The District has plans for the ultimate completion of the entire 6.88 miles for water conservation and for the continuation and sustainability of Phase 1.

Indirect Costs - NA

Total Costs
The total estimated budget for the project is $605,675.60

Environmental and Cultural Resources Compliance

1. The Bayview Irrigation District #11 will comply with NEPA and all applicable state, Federal and local environmental, cultural, and paleontological resource protection laws and regulations.
2. The proposed project will be built within the existing canal channel, which should minimize impacts on the surrounding environment. Construction may result in dust, which will be mitigated by watering. If additional control measures are needed, they will be implemented.
3. The Lower Rio Grande Valley of South Texas is one of the most biologically diverse regions of the United States. This diversity includes numerous threatened or endangered species including the ocelot and aplomado falcon, and plants such as star cactus, Walker's manioc, and Texas ayenia. The route of Phase 1 of the Main Canal Pipe Conversion Project is entirely within the City of Los Fresnos. These species are not expected to be found within the area impacted by project activities.
4. There are no surface waters of the United States in the area. There are no wetlands inside the project boundary that potentially fall under the CWA. The project will benefit natural wetlands and coastal natural resource areas through the water conservation and water quality protection it will achieve.

5. The Main Canal was completed in 1929. It has degraded in 90 years and should be replaced with pipe.
6. There are no historic buildings, structures, or features within the project boundaries.
7. There are no known archeological sites in the proposed project area.
8. The proposed project is not expected to have any adverse effect on low income or minority populations. It will have a positive effect on water quantity and water quality for the 90% Hispanic population of the region and the 33% of the population living below Federal poverty level. With the City of Los Fresnos Trail to be built above the buried pipe, the project will facilitate many benefits for low income and minority populations.
9. There are no Indian sacred sites or other tribal land in the area near the project.
10. The proposed project is not expected to contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area. The proposed project may eradicate nutria from the project area by eliminating the open canal waters and bare, soil banks.

Required Permits or Approvals

If the NEPA review process finds that the project requires permits or approvals, those will be obtained. The District will also consult with the Texas Historical Commission for any requirements.

Disclosure of Lobbying Activities

The Bayview Irrigation District #11 does no lobbying activities.

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix A – Letters of Support

March 13, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

The City of Los Fresnos is committed to the Bayview Irrigation District #11 Main Canal Pipe Conversion Project. On Tuesday, January 8, 2019 the City Council of the City of Los Fresnos voted unanimously to fund the $150,000 match for a Bayview Irrigation District #11 grant applications to the Texas Water Development Board Agricultural Water Conservation Grants Program and the subsequent Bureau of Reclamation Water and Energy Efficiency Grant. These funds are available. There are no time constraints or other contingencies associated with this funding commitment or the availability of funds. We are looking forward to a $150,000 award from the Texas Water Development Board so that $300,000 in funds will be available as a match for the Bureau of Reclamation grant.

In addition to water conservation, the Main Canal Pipe Conversion Project will offer a variety of benefits to Los Fresnos residents and visitors, and Phase 1 will initiate this venture. The City has planned a hike and bike trail along the irrigation canal, with permission granted by the District. The pipe conversion will allow the City to place the trail on top of the buried pipe, providing additional safety, space, and opportunities for amenities and beautification. It will facilitate maintenance and offer public access approaches from both sides of the trail. We also eagerly anticipate the emergency drainage assistance that will be built into future phases of the project to help protect lives and property from flooding like that which we experienced in June 2018.

I look forward to working with you. Please contact me if I can assist further in this important endeavor.

Sincerely,

Mark W. Milum
City Manager

Date: Friday, March 15, 2019 7:11 AM

From: David Carter <David.Carter@twdb.texas.gov>

To: palexander@rgv.rr.com <palexander@rgv.rr.com>, Cameron Turner <Cameron.Turner@twdb.texas.gov>

Subject: RE: Bayview Irrigation District application

Good Morning Patty!

Thank you for your email. I can confirm here that the Texas Water Development Board is in receipt of your application for a $150,000 Agriculture Water Conservation Grant and that your project is currently under consideration for funding. A decision on the award of these funds is expected in April. Should the Bayview Irrigation District #11 be awarded a grant, we will proceed to negotiate a contract at that time. Should you need any additional information, please let me know.

Best Regards,

- David

David Carter, CTCM

Director, Support Services and Contract Administration

Texas Water Development Board

P.O. Box 13231

Austin, Texas 78711-3231

(512) 936-6079

www.twdb.texas.gov

ARROYO COLORADO
Know it. Respect it. Enjoy it.
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The Arroyo Colorado Watershed Partnership

2401 E. Highway 83
Weslaco, Texas 78596

956/969-5607 Office 956/969-5639 Fax www.arroyocolorado.org

March 13, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District #11
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

The Update to the Arroyo Colorado Watershed Protection Plan, accepted by the U.S. Environmental Protection Agency in 2017, was developed by Texas Water Resources Institute, the Texas Commission on Environmental Quality, and with the dedication and input from hundreds of stakeholders in the Arroyo Colorado Watershed Partnership. The Plan outlines many Implementation Measures aimed at implanting irrigation management practices and educational programs to conserve water and reduce agricultural runoff throughout the Lower Rio Grande Valley. Partners include Texas Water Resources Institute, Texas State Soil and Water Conservation Board, Texas Water Development Board, Texas A&M AgriLife Extension Service, Natural Resources Conservation Service and the local agricultural community. We are eager to work with the Bayview Irrigation District #11 to promote O&E workshops promoting NRCS cost programs. The Arroyo Colorado Watershed Partnership will also host project data on our website. This collaboration will enhance our effectiveness in reaching agricultural producers in your area, other irrigation districts, and decision makers throughout the region.

The proposed project on your Main Canal will accomplish many BMPs in the plan. Converting the channel to pipe will reduce loss of irrigation water through seepage and evaporation to conserve water and reduce concentrations of pollutants and salinity.

We are happy to support your efforts and your application to the Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant Program.

Sincerely,

Jaime Flores
for Arroyo Colorado Watershed Partnership

Cameron County Irrigation District No. 6
P.O. Box 295
Los Fresnos, Texas 78566
(956)399-7186 ~ Fax (956) 399-7213

March 13, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District #11
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

As the district that supplies water from the Rio Grande River to the Bayview Irrigation District #11, Cameron County Irrigation District #6 is pleased that you are working toward water conservation and efficiency. District #6 received a WaterSMART Water and Energy Conservation Grant from the Bureau of Reclamation in 2015. With that funding we completed a pipe conversion, replaced a pump, and added a solar powered lift pump. The project has already resulted in hundreds of acre-feet of water conservation. The relationship between our projects will conserve water throughout the system and encourage other districts to invest in efficiency measures.

The proposed Bayview Irrigation District #11 Main Canal Pipe Conversion Project is a prime example of the improvements that will have lasting effects. Converting irrigation canals to pipe will result in reduced water loss to seepage and evaporation and more reliable water delivery. If every irrigation canal had these improvements, a water savings of up to forty percent could be realized. This project is the basis for long-term water management and protection.

We proudly support the Bayview Irrigation District #11 Main Canal Pipe Conversion Project 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,

Tito Nieto
General Manager

FILEMON VELA
34TH DISTRICT, TEXAS

COMMITTEE ON AGRICULTURE
CHAIRMAN
SUBCOMMITTEE ON GENERAL FARM COMMODITIES AND RISK MANAGEMENT
SUBCOMMITTEE ON COMMODITY EXCHANGES, ENERGY AND CREDIT
SUBCOMMITTEE ON LIVESTOCK AND FOREIGN AGRICULTURE

COMMITTEE ON ARMED SERVICES
SUBCOMMITTEE ON SEAPOWER AND PROJECTION FORCES
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Congress of the United States
House of Representatives
Washington, DC 20515–4334

307 CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-9901

800 N. EXPRESSWAY 77/83, SUITE 9
BROWNSVILLE, TX 78521
(956) 544-8352

500 EAST MAIN STREET
ALICE, TX 78332
(361) 230-9776

1390 W. EXPRESSWAY 83
SAN BENITO, TX 78586
(956) 276-4497

301 WEST RAILROAD
WESLACO, TX 78596
(956) 520-8273

March 13, 2019

The Honorable Brenda Burman
Commissioner
U.S. Bureau of Reclamation
1849 C St., NW #7654
Washington, DC 20240

Dear Ms. Burman:

As the U.S. Representative for 34th Congressional District of Texas and a Member of the House Agriculture Committee, I write to express my strong support for the application of Bayview Irrigation District #11 (BVID) for the Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant to assist with the Main Canal Pipe Conversion Project.

Due to my strong family background in agriculture I understand the need to implement projects that will conserve water and enhance water delivery efficiency and reliability.

Agriculture in South Texas has an enormous economic impact. The industry is dependent on our current and future water supply, but as much as 40% percent of water transmitted for irrigation and municipal use in our region is lost to seepage, evaporation, and other factors. Converting open channels to pipe will not only conserve water by reducing seepage and evaporation, it will reduce the potential for catastrophic failures that could result in an interruption in delivery. This project will boost sustainability in water conservation and supply management.

In partnering not only with the Bureau of Reclamation, but also with the Texas A&M AgriLife Extension Service, the Texas Water Resources Institute, and the Natural Resources Conservation Service for outreach and information, BVID will encourage additional irrigation districts, agricultural producers, and others to participate in water conservation and water quality protection. These outreach efforts will ensure that future generations of Texans will have the water they need.

I support BVID's efforts to conserve water in our region and appreciate your thoughtful consideration of their request for WaterSMART funding.

Sincerely,

Filemon Vela
Member of Congress

RGRWA
RIO GRANDE REGIONAL WATER AUTHORITY

January 10, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

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 Bayview Irrigation District Main Canal is a prime example of the improvements we endorse. Converting open irrigation canals to pipe will result in reduced water loss to seepage and evaporation and a more reliable water delivery system. If every irrigation canal had these improvements, a water savings of up to forty percent could be realized. This project is the basis for long-term water management and protection.

We happily support the efforts of the Bayview Irrigation District and your application to the Texas Water Development Board Agricultural Water Conservation Grants Program. Please contact me if we can be of assistance.

Sincerely,

Jim Darling
President

Sincerely,

Jim Darling
General Manager

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

Texas House of Representatives

EDDIE LUCIO III
DISTRICT 38
CAMERON COUNTY

March 13, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District #11
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

It is with great pleasure that I wholeheartedly endorse the Bayview Irrigation District #11 in its application for funding to the Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant Program. As a member of the Texas House of Representatives, I served on the Natural Resources Committee for several years, and the Advisory Committee for the State Water Implementation Fund for Texas. Now, I serve as the Chairman on Insurance and on the Public Health Committee, but the topic of natural resources will always be near and dear to my heart. I understand and support your project and its numerous benefits in efficiency, conservation, and reliable water delivery.

Conservation is a shared responsibility. It is critical to work collaboratively for better management of natural and financial resources. Converting irrigation canals to pipe and improving other infrastructure are important elements in sustainability. This project will result in reduced water loss to seepage and evaporation, reduced water pollutant concentration, and more dependable water delivery. If every irrigation canal had these improvements, a water savings of up to forty percent could be realized. This project is the basis for long-term water management and protection and I applaud your efforts to leverage local funds, state grants, and federal grants to accomplish these goals.

Please do not hesitate to contact either of my state offices at (956) 542-2800 or (512) 463-0606 for any questions regarding this letter. Thank you for the consideration!

Sincerely,

Eddie Lucio III

Eddie Lucio, III
State Representative
District 38

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix B – Official Resolution

Resolution of the Board of Directors of Bayview Irrigation District #11

Bureau of Reclamation WaterSMART 2019 Water & Energy Efficiency Grant

WHEREAS, Bayview Irrigation District #11 (the District) is an irrigation district organized under Chapter 59, Article 16 of the Texas Constitution and operates under Chapter 58 and Chapter 49, in part, of the Texas Water Code;

WHEREAS, the District is committed to water conservation, reliable and efficient water delivery, and energy efficiency, and;

WHEREAS, the District is seeking opportunities to implement projects that result in quantifiable water savings and water reliability benefits, and;

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

WHEREAS, the District is seeking partnerships that will supplement and enhance the capacity of the District to accomplish water conservation projects;

NOW THEREFORE, BE IT RESOLVED that the Board of Directors of the Bayview Irrigation District #11 agrees and authorizes that:

1. General Manager, Vicente Ramirez, is authorized to act as the designated representative for the District and has the legal authority to enter into an agreement and to sign all necessary documents; and

2. The Board of Directors has reviewed this proposal and supports and authorizes the submittal of this application to the Bureau of Reclamation WaterSMART 2019 Water and Energy Efficiency Grant; and

3. The District is capable of providing the amount of funding and/or in-kind contributions, specified in the funding plan; and

4. If selected for funding, the District will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement.

Passed by an affirmative vote of the District Board of Directors on this 20th day of February, 2019.

Ernesto Martinez, Board President
Bayview Irrigation District #11

Vicente Ramirez, General Manager
Bayview Irrigation District #11

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix C – Letters Regarding NRCS Technical or Financial Assistance

TEXAS A&M AGRILIFE RESEARCH | EXTENSION

TEXAS A&M UNIVERSITY
AGRICULTURE & LIFE SCIENCES

TEXAS WATER RESOURCES INSTITUTE

March 18, 2019

To: Mr. Vicente Ramirez, General Manager
Bayview Irrigation District #11
110 S. San Roman Rd.
Los Fresnos, TX 78566

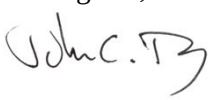
Re: Support for Bayview Irrigation District #11 WaterSMART grant application

Dear Mr. Ramirez:

We are pleased that the Bayview Irrigation District #11 plans to apply to the Bureau of Reclamation for a WaterSMART grant. Your plans for water conservation and efficiency along the Main Canal will complement on-farm irrigation improvements that TWRI, AgriLife, and our partners are working toward. In 2012, TWRI received a $2,964,000, five-year Regional Conservation Partnership Program (RCPP) Grant from the NRCS to address both water quantity and water quality resource concerns in HUCs 12110208 and 13090002. The project improves the use of innovative irrigation techniques and technologies that decrease water use, improve productivity, and reduce irrigation return flows. With the NRCS and our other partners we evaluate and demonstrate automated irrigation systems, encourage adoption of innovative nutrient and irrigation management, provide technical and financial assistance to support eligible on-farm implementation, and support and collaborate with regional planning efforts. Priority conservation practices promoted in this program include those associated with irrigation water management, irrigation systems, land leveling, irrigation pipeline and other eligible on-farm irrigation improvements. Agricultural producers from the Bayview Irrigation District #11 have participated in NRCS-financed programs and many have received financial and technical support from NRCS. The Main Canal Project will facilitate eligible on-farm improvements in the future, making them more feasible and effective. We expect the project to encourage additional landowners and agricultural producers to seek technical and financial assistance from the NRCS. These on-farm projects could conserve hundreds of acre-feet of water annually in addition to the conservation achieved by the Main Canal Project. TWRI will target the Bayview Irrigation District #11 area for future educational programs, technical support, and financial assistance to maximize the impact of the WaterSMART grant.

Significant population growth has put greater pressure on the area's limited water supply. Water conservation must become a much larger factor in the future with agriculture shouldering the majority of the burden. I appreciate your support and promotion for our outreach and education efforts, and I am happy to work with you to achieve conservation goals.

Best Regards,



John C. Tracy

578 John Kimbrough Blvd, Suite 100
Mailstop 2260 TAMU
College Station, TX 77840
Tel. 979.862.7221 Fax 979.845.0662
John.tracy@ag.tamu.edu http://twri.tamu.edu

Print

Date: Monday, March 18, 2019 10:23 AM

From: Gutierrez, Deanna L - NRCS, San Benito, TX <Deanna.Gutierrez@tx.usda.gov>

To: Palexander@rgv.rr.com <Palexander@rgv.rr.com>

Subject: RCPP-EQIP Irrigation Pipeline assistance

Good Morning Patti,

It was a pleasure speaking to you. Since I was already in our System looking up our county I went ahead and looked up Hidalgo and Willacy Counties also, since we are all part of the same Resource Team. The Years and counties are as followed

2016 FY
Cameron County
3 contracts
Hidalgo County
3 Contracts
Willacy County
None

2017 FY
Cameron County
7 Contracts
Hidalgo County
16 Contracts
Willacy County
1 Contract

2018 FY
Cameron County
6 Contracts
Hidalgo County
4 Contracts
Willacy County
1 Contract

As of Today I am not aware of any Irrigation pipeline that have been implemented to date this year, but There are a few funded contracts awaiting installation. We have about 15 Irrigation pipeline applications for this Fiscal year that may or may not get funded around late spring early summer. I am not sure about the other counties and wont know till they complete the plans for each applicant. I do notice the majority of Cameron County applications come in from either La Feria Irrigation, Cameron County Irrigation #2, and on occasion Harlingen Irrigation district. I am not sure if other Managers are not aware of our programs, or just don't push them. When we do get people from other districts they have either registered next door at the FSA office, or attended a program put on by Agrilife, or USDA Agencies. I hope this information helps with your grant writing, please feel free to give me a call or email for any other information you many need for future projects. Thank you.

Deanna Lynn Gutierrez

Soil Conservationist
USDA-NRCS
2315 W. Expressway 83, Suite #3
San Benito, Texas 78586
Office (956) 399-1311 ext.6379
Fax (844) 496-8084
Email Deanna.Gutierrez@tx.usda.gov

March 14, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District #11
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

Not only do I serve on the Board of Directors for the Bayview Irrigation District, I am a rancher with agricultural land within the District. Water is one of the most important resources in agricultural production. I fully support our plan to convert the Main Canal from open channel to pipe, and our application for funding to the Bureau of Reclamation Water and Energy Efficiency Grants Program.

I recently received an NRCS grant to construct irrigation pipeline on my own property. Just as with my NRCS project, the Main Canal project will facilitate better farming practices and management. Pipe conversion will reduce leakage and evaporation and reduce the concentrations of pollutants and salinity. Better reliability in water pumping and delivery is critical to watering schedules and the economic viability of local farms and ranches. Pipe conversion will also protect the surrounding land from flooding that could occur with canal breaks. With the Main Canal Pipe Conversion Project, a more efficient transport of irrigation water will allow other local agricultural producers to take advantage of NRCS incentives. I am happy to assist the District, NRCS, and AgriLife Extension Service to inform them of these opportunities.

Farming this land a big part of my life. Concern for conservation and the environmental health of the land and water are a vital part of that. With the City of Los Fresnos, Texas Water Development Board, and the Arroyo Colorado Watershed Partnership, Texas Water Research Institute, and AgriLife Extension Service as our partners, this project will successfully help to ensure the future of agriculture and conservation in this fertile area.

Sincerely,

Stephen Reynolds

March 14, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District #11
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

Not only do I serve on the Board of Directors for the Bayview Irrigation District, I am a rancher with agricultural land within the District. Water is one of the most important resources in agricultural production. I fully support our plan to convert the Main Canal from open channel to pipe, and our application for funding to the Bureau of Reclamation Water and Energy Efficiency Grants Program.

Thank you for advising me about the availability of NRCS assistance and incentives through their EQIP program. Although the Main Canal Pipe Conversion is in its early stages, I have begun the process to apply for NRCS funding to convert open canals to pipeline and to add pipeline to other fields. I have met with Diana Guttierez, our local NRCS representative, to start on a conservation plan and to begin the paperwork. I am also recommending the program to other farmers and ranchers in our district. Many plan to apply. The added agricultural production along with water conservation and efficiency will be a great boost to our local economy. With the Main Canal Pipe Conversion Project, a more efficient transport of irrigation water will allow other local agricultural producers to take advantage of NRCS incentives. I am happy to assist the District, NRCS, and AgriLife Extension Service to inform them of these opportunities.

I have accumulated this land throughout my life and I have great respect for conservation and the environmental health of the land and water. With the City of Los Fresnos, Texas Water Development Board, and the Arroyo Colorado Watershed Partnership, Texas Water Research Institute, and AgriLife Extension Service as our partners, this project will successfully help to ensure the future of agriculture and conservation in this fertile area.

Sincerely,

Ernesto Martinez

March 14, 2019

Mr. Vicente Ramirez
General Manager
Bayview Irrigation District #11
110 S. San Roman Rd.
Los Fresnos, TX 78566

Dear Mr. Ramirez:

I am glad that the Bayview Irrigation District #11 plans to apply to the Bureau of Reclamation for a WaterSMART grant. Your plans for water conservation and efficiency along the Main Canal will complement on-farm irrigation improvements and make them more feasible and effective. Conversion to pipe will facilitate my on-farm improvements and efficiencies.

Due to the planned improvements of the Main Canal, I am applying to the NRCS for financial assistance for an on-farm irrigation improvement in which I will convert an open canal to underground pipe to irrigate 50 acres.

Irrigation district improvements in water delivery and reliability have been proven to enhance the effectiveness of on-farm irrigation improvements to save money and conserve water. I support your efforts and I plan to participate in additional conservation on my own land.

Sincerely,

Gilberto Hernandez
Gilberto Hernandez

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix D – Engineer's Feasibility Report for Overall Project

Moore Land Surveying, LLC

14216 Palis Drive
La Feria, TX 78559

(956)245-0988
(956)245-4651

TBPLS Firm No. 10194186
TBPE Firm No. 19190

Mr. Vicente Ramirez
Bayview Irrigation District No. 11 General Manager
110 S. San Roman Road
Los Fresnos, TX 78566

January 7, 2019

Re: **MAIN CANAL PIPING PROJECT**

Mr. Ramirez:

Our firm has performed preliminary topographical surveying and design in order to assess the feasibility of converting Bayview Irrigation Districts No. 11 (the District's) Main Canal from open canal to buried PVC pipeline. The referenced canal which is 6.88 miles in total length is a mixture of earthen and failed concrete lining, and delivers water from a Cameron County Irrigation District No. 6 (CCID No. 6) canal at Highway 100 in Los Fresnos, TX to the Resaca de los Cuates in Bayview, TX where the District then delivers it to its customers. The purpose of this conversion is to conserve water lost to seepage and evaporation in the open canal by converting it to a modern rubber gasketed PVC pipeline.

Based on data produced by the Texas AgriLIFE Extension Service it is estimated that open canals in south Texas lose approximately 235.30 Ac.-FT of water per mile of canal per year. For the District's Main Canal this amount comes to 1,619 Ac.-Ft per year. Based on conversations with District staff it was estimated that the Main Canal breaks approximately 1.5 times per year losing an average of 3 Ac.-Ft per occurrence which comes to 4.5 Ac.-Ft per year lost to breaks. Based on NWS pan evaporation data, it was estimate that the Main Canal loses approximately 50 Ac.-Ft of water to evaporation annually. The combined water loses from seepage, evaporation, and breaks is estimated to be 1,673.5 Ac.-Ft annually.

The maximum water surface at the upstream end of the was determined to be 24.17' MSL and the water surface in the Resaca de los Cuates was 16.11' MSL. Based on conversations with the District's staff it was determined that the canal needed to be able to convey a maximum of 30 CFS during peak demand watering seasons. With these parameters a hydraulic model and calculations were completed and it was determined that a 48" PVC pipe is sufficient to convey this flow rate.

The cost estimate for the entire project is estimated to be approximately $10,000,000. Based on the high price it is suggested the District pursue grants and low interest loans in order to complete the project and complete it in phases over a 10-year span. For the first phase it is recommended to attempt to complete the first 1,350 Ft north of Highway 100 in Los Fresnos, TX. The estimated cost of construction and design is $305,125.00. By pursuing a TWDB Ag Water Conservation Grant for $150,000 and matching a minimum of $150,000. This portion could readily be completed within a one-year period to include NEPA compliance, design, bidding & construction.

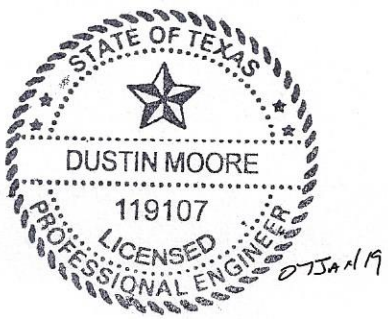
The entire site is in previously disturbed areas and there are no anticipated negative environmental or historical impacts. However, prior to any work the District will be required to clear all NEPA requirements.

From a design standpoint the project is considered feasible. The pipe required to handle the flow can be purchased readily from regional pipe distributors. There are multiple local contractors qualified to install it, and there are no anticipated environmental or historical barriers. The price is high, but with a phased implementation plan and pursuing innovative funding options it is reasonable that the project could be completed in the estimated 10 years.

Should you have any questions please feel free to contact myself at 956-245-4651 or d.moorelandsurveying@gmail.com.

Respectfully,

Dustin Moore, PE
Moore Land Surveying, LLC



Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix E – Maps and Photos

1. Area Map, including District boundaries (District circled) (from the 2016 Region M Regional Water Plan)
2. District Map with Boundaries, includes location of the Main Canal and the project Phase 1 location (circled)
3. Detail overview of Main Canal Pipe Conversion Project, with Phase 1 circled
4. Detail overview of the project Phase 1 location.
5. Maps of the Bayview Irrigation District #11
6. Photographs of existing Main Canal showing project site, deterioration of Main Canal at project site (between irrigation deliveries), water theft from the project site, and an NRCS project currently under construction in the District.

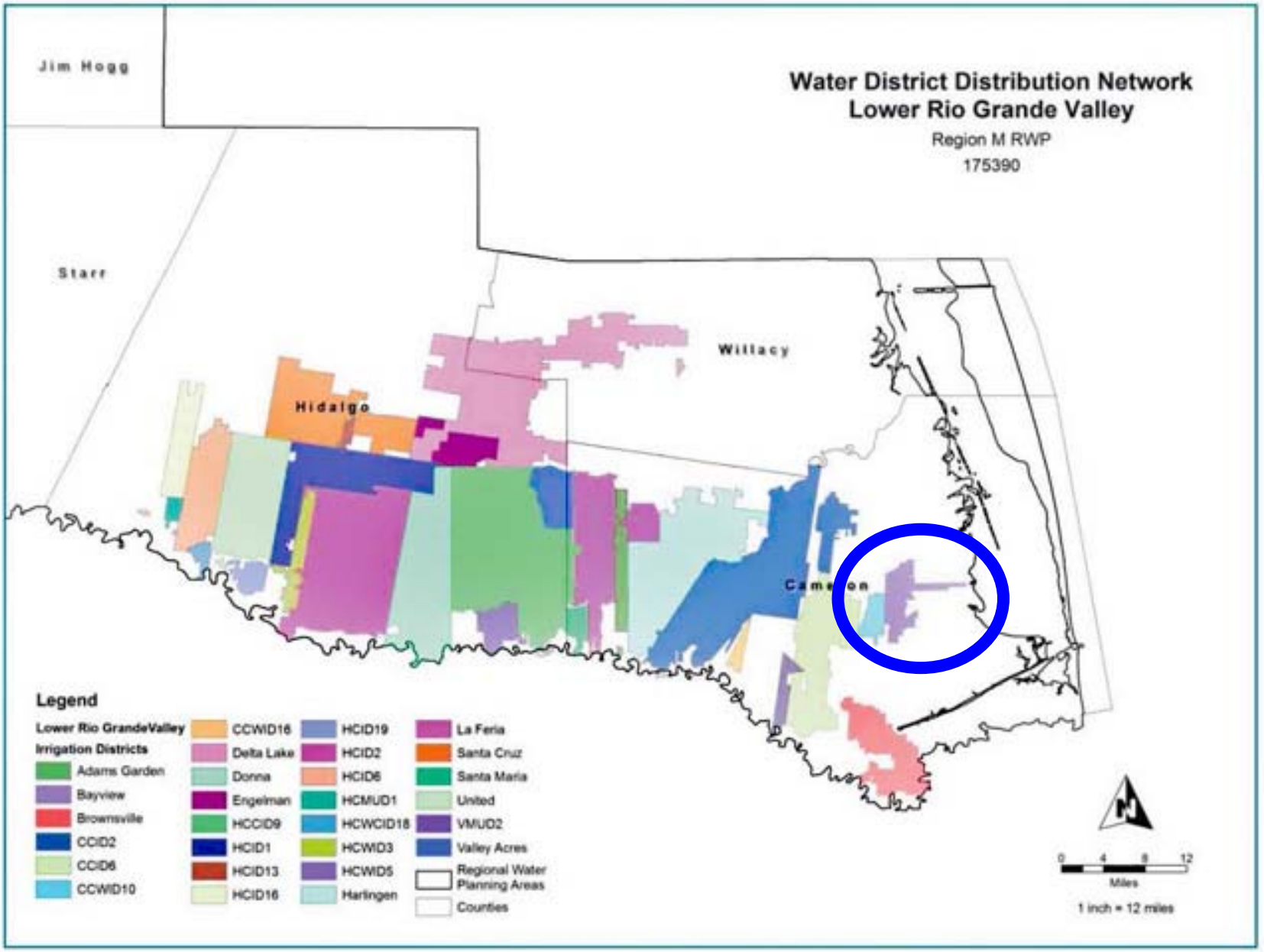
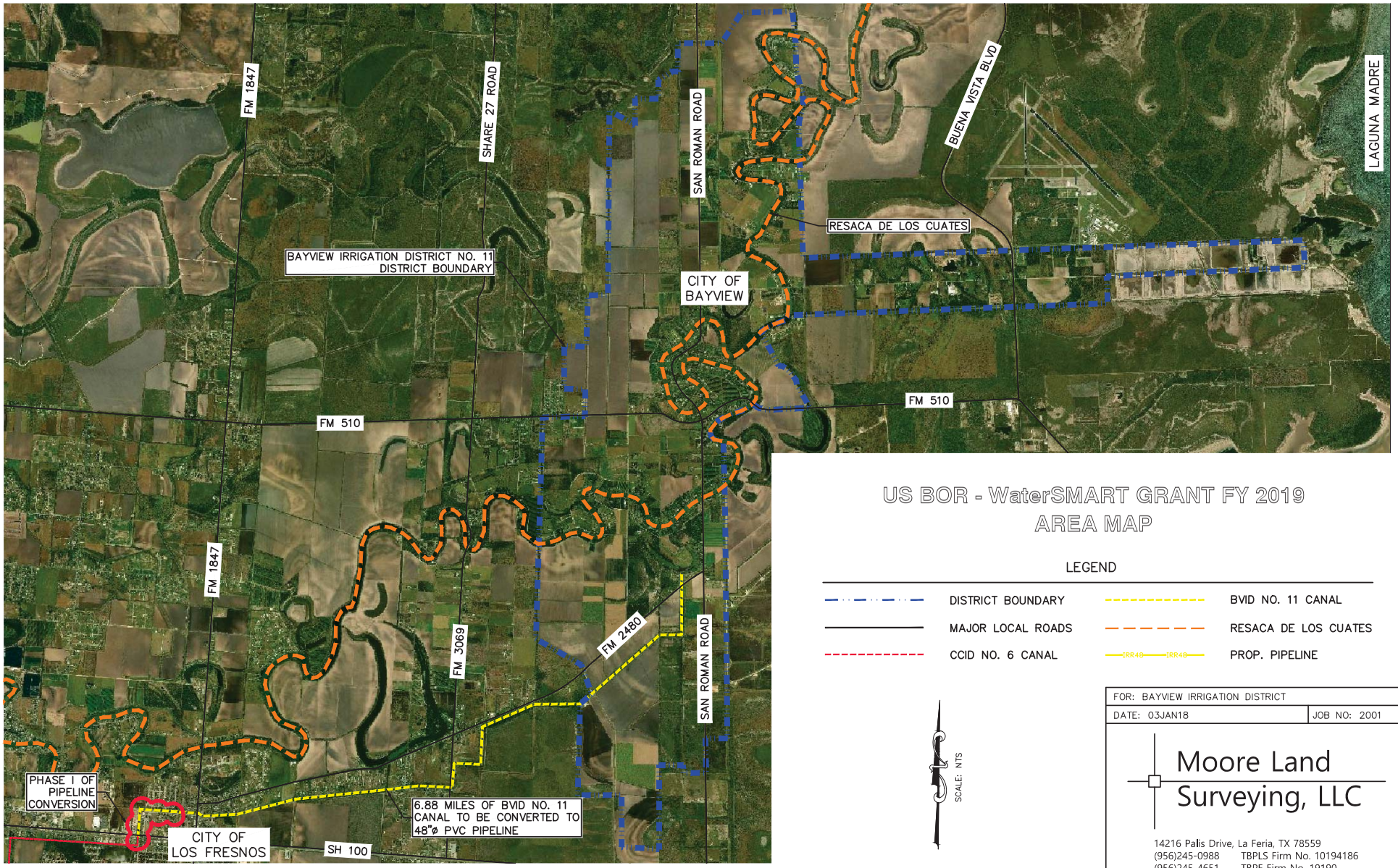


Figure 7 Water District Distribution Network, Lower Rio Grande Valley



US BOR - WaterSMART GRANT FY 2019
AREA MAP

LEGEND

- DISTRICT BOUNDARY
- MAJOR LOCAL ROADS
- CCID NO. 6 CANAL
- BVID NO. 11 CANAL
- RESACA DE LOS CUATES
- PROP. PIPELINE

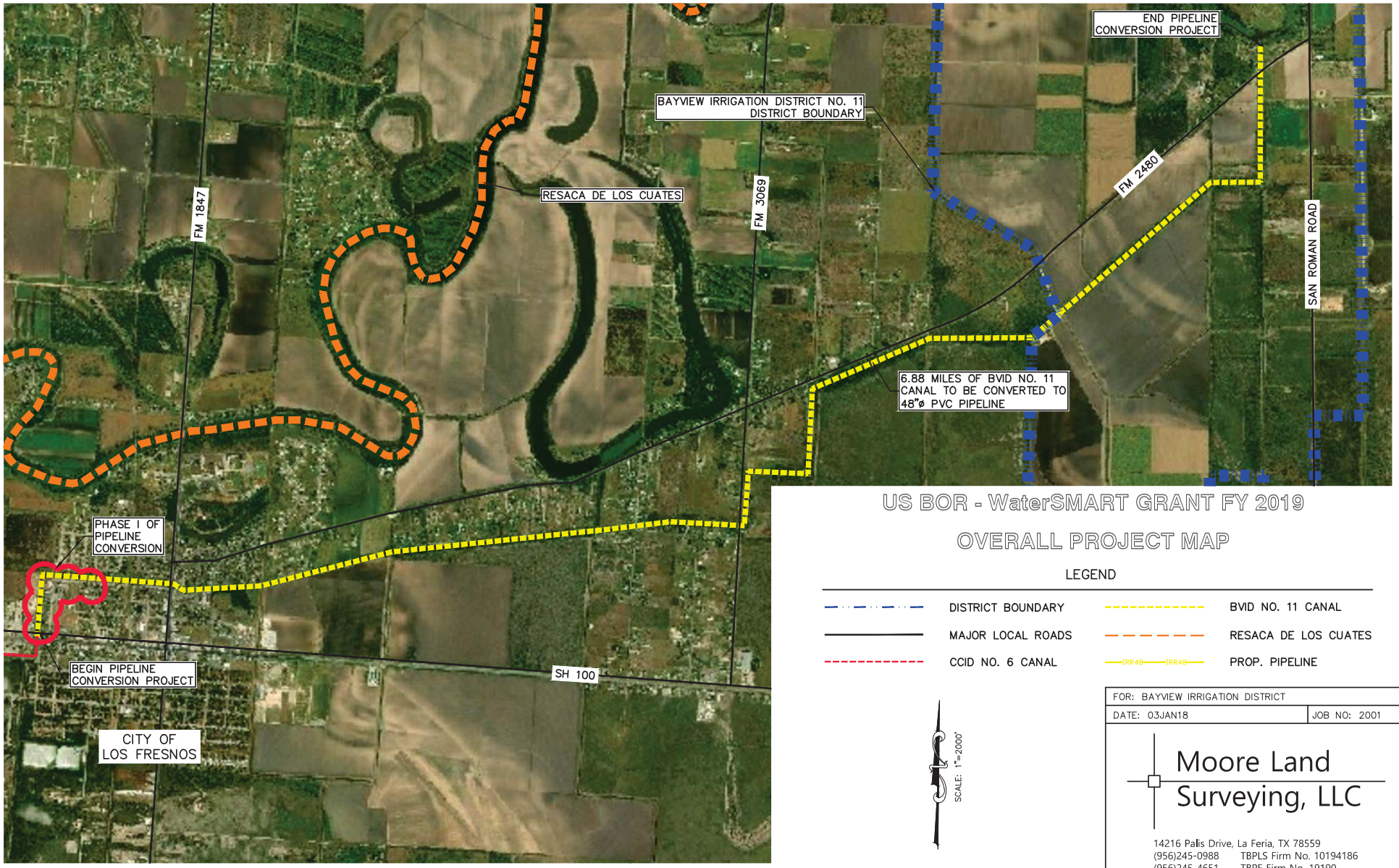
SCALE: NTS

FOR: BAYVIEW IRRIGATION DISTRICT

DATE: 03JAN18 | JOB NO: 2001

Moore Land Surveying, LLC

14216 Palis Drive, La Feria, TX 78559
(956)245-0988 TBPLS Firm No. 10194186
(956)245-4651 TBPE Firm No. 19190



US BOR - WaterSMART GRANT FY 2019

OVERALL PROJECT MAP

LEGEND

DISTRICT BOUNDARY	BVID NO. 11 CANAL
MAJOR LOCAL ROADS	RESACA DE LOS CUATES
CCID NO. 6 CANAL	PROP. PIPELINE

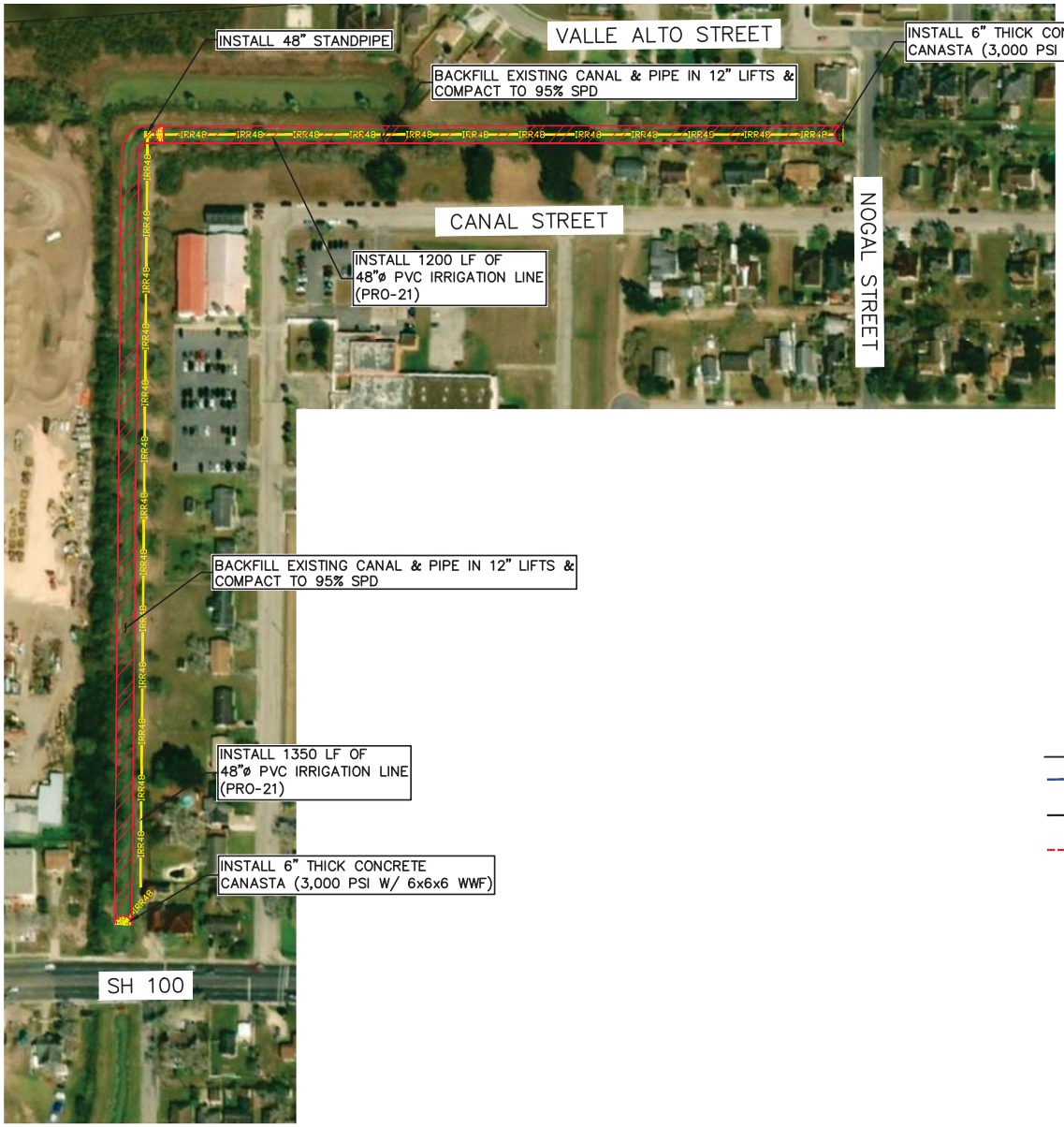
SCALE: 1"=2000'

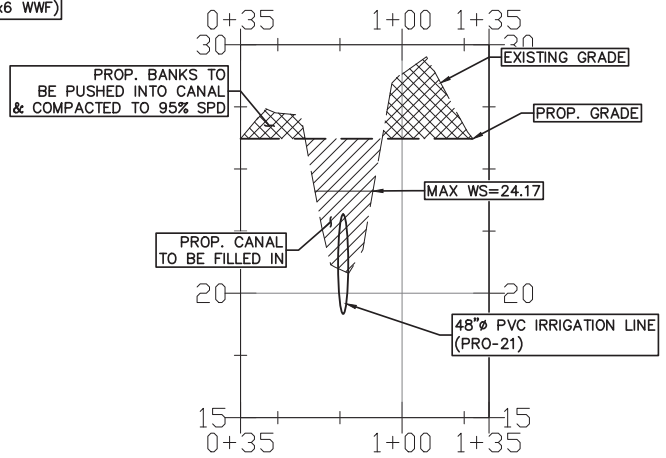
FOR: BAYVIEW IRRIGATION DISTRICT

DATE: 03JAN18 | JOB NO: 2001

Moore Land Surveying, LLC

14216 Palis Drive, La Feria, TX 78559
(956)245-0988 TBPLS Firm No. 10194186
(956)245-4651 TBPE Firm No. 19190





TYPICAL CROSS SECTION

SCALE: 1"=50'

US BOR - WaterSMART GRANT FY 2019
PHASE I - PROJECT MAP

LEGEND

- DISTRICT BOUNDARY
- MAJOR LOCAL ROADS
- CCID NO. 6 CANAL
- BVID NO. 11 CANAL
- RESACA DE LOS CUATES
- PROP. PIPELINE

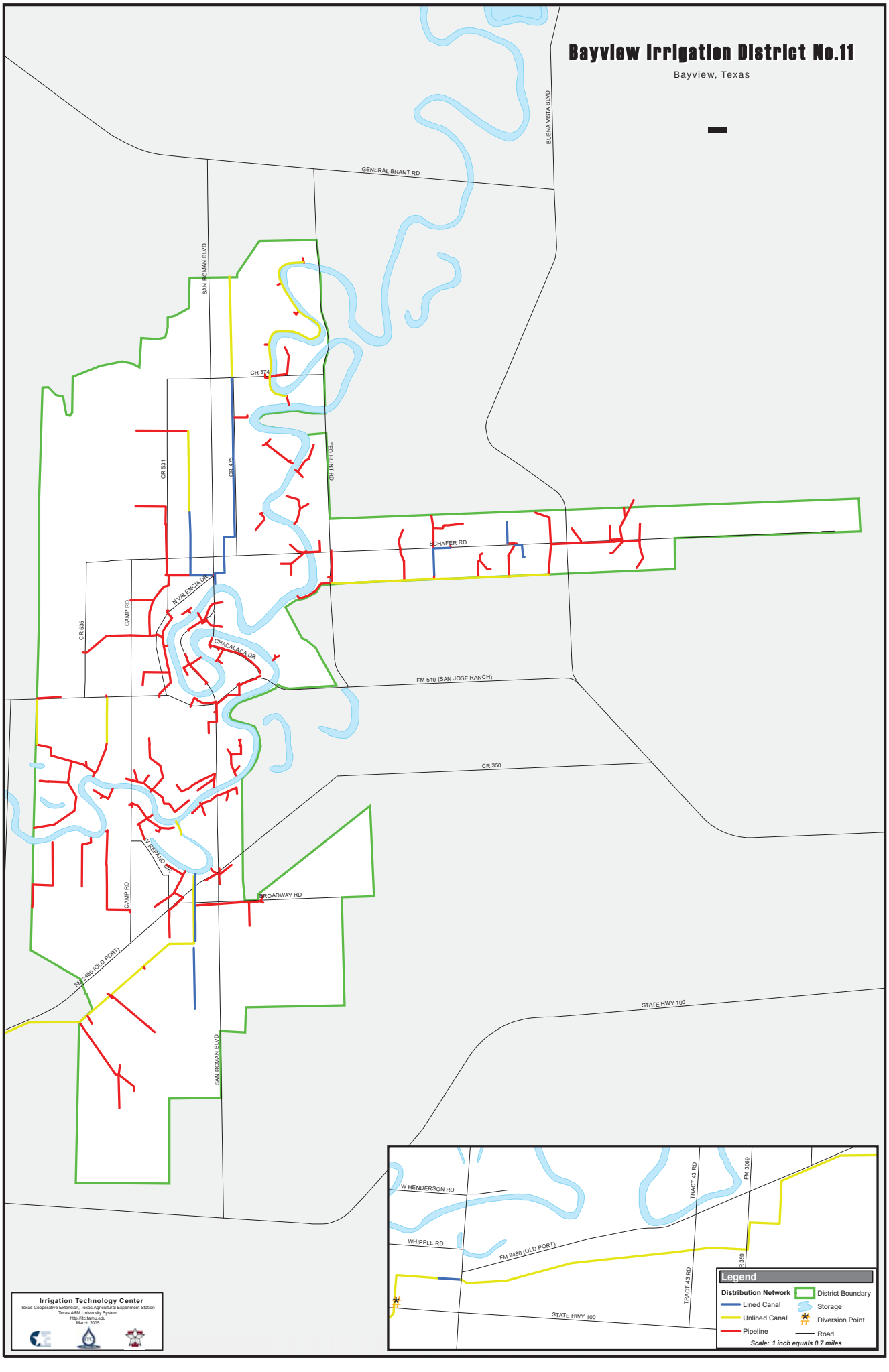
SCALE: 1"=200'

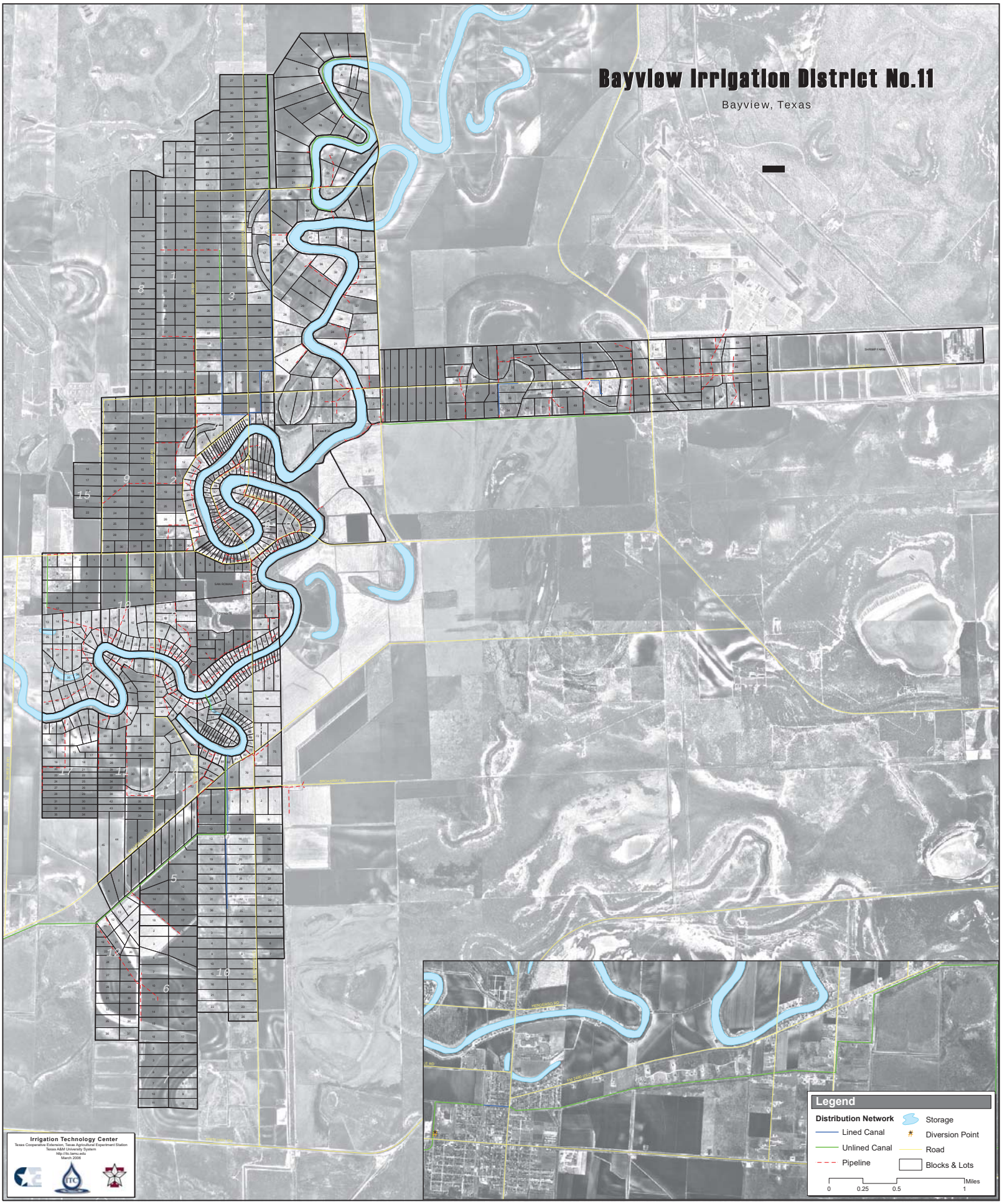
FOR: BAYVIEW IRRIGATION DISTRICT

DATE: 03JAN18 | JOB NO: 2001

Moore Land Surveying, LLC

14216 Palis Drive, La Feria, TX 78559
(956)245-0988 TBPLS Firm No. 10194186
(956)245-4651 TBPE Firm No. 19190


Bayview Irrigation District No.11
Bayview, Texas
GENERAL BRANT RD
BUENA VISTA BLVD
SAN ROMAN BLVD
CR 374
CR 531
CR 475
TED HUNT RD
SCHAFER RD
N VALENCIA DR
CAMP RD
CR 535
CHACALACA DR
FM 510 (SAN JOSE RANCH)
CR 350
N REPANO DR
BROADWAY RD
FM 2480 (OLD PORT)
STATE HWY 100
W HENDERSON RD
WHIPPLE RD
TRACT 43 RD
FM 3069
R 186
Irrigation Technology Center
Texas Cooperative Extension, Texas Agricultural Experiment Station
Texas A&M University System
http://itc.tamu.edu
March 2005
Legend
Distribution Network
Lined Canal
Unlined Canal
Pipeline
District Boundary
Storage
Diversion Point
Road
Scale: 1 inch equals 0.7 miles


Bayview Irrigation District No.11
Bayview, Texas
Legend
Distribution Network
Lined Canal
Unlined Canal
Pipeline
Storage
Diversion Point
Road
Blocks & Lots
Miles
0
0.25
0.5
1
Irrigation Technology Center
Texas Cooperative Extension, Texas Agricultural Experiment Station
Texas A&M University System
http://itc.tamu.edu
March 2006

Bayview Irrigation District #11— Project Site

Main Canal Pipe Conversion, Phase 1

Water Conservation Through Improved Efficiency and Reliability

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1

Main Canal in Project Site

(Shows deterioration of 90-year-old canal lining)

Main Canal near Project Site—Crossing FM 1847 in Los Fresnos

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1

Main Canal Water Theft within Project Site

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1

Reynolds NRCS irrigation Improvement Project

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix F – Bayview Irrigation District #11
Conservation Policy and Drought Policy

Texas Commission on Environmental Quality

AGRICULTURAL WATER CONSERVATION PLAN (NON-IRRIGATION)

This form is provided to assist entities in conservation plan development for agricultural (non-irrigation) water use. If you need assistance in completing this form or in developing your plan, please contact the conservation staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Name: Bayview Irrigation District #11
Address: 110 S. San Roman
Telephone Number: (956) 233-5800 Fax: (956) 233-4343
Form Completed by: Vicente Ramirez
Title: General Manager

Signature: 3/20/2015

NOTE: If the plan does not provide information for each requirement, include an explanation of why the requirement is not applicable.

I. BACKGROUND DATA

A. *Water Use*

1. Annual diversion appropriated or requested (in acre-feet): 17,793.5250

2. Maximum diversion rate (cfs):

B. *Water Sources*

1. Please indicate the maximum or average annual amounts of water currently used and anticipated to be used (in acre-feet) for agricultural (non-irrigation) purposes:

Source	*Water Right No.(s)*	*Current Use*	*Anticipated Use*
Surface Water	0835-003; 0105-000; 0835-001; 3128-000	183.1300; 547.000; 16978.0250; 268.000	6000 ac. ft
Groundwater			
Purchased			
Total		17976.155	6,000 ac.ft.

2. How was the surface water data and/or groundwater data provided above (B1) obtained?

Master meter √ ; Customer meter √; Estimated _____; Other _____

3. Was purchased water raw or treated?

If both, % raw √; % treated _____ and Supplier(s): _____

C. Agricultural Activity

1. Provide a description of the agricultural activity.

Agriculture activity in the area consists of orchards, cotton, grain, corn and sugarcane farming.

II. WATER USE AND CONSERVATION PRACTICES

A. Agricultural Activity Water Use

1. Provide a detailed description of how the water will be utilized in the production process including how the water is diverted and transported from the supply source(s).

The amount of District 11's water is diverted and delivered by District 6 is the amount of water available from the Rio Grande under the water allocation of District 11 on the rolls of the Watermaster, pursuant to District 11's Water Rights.

2. Estimate the quantity of water consumed in the production process and is therefore unavailable for reuse, discharge, or other means of disposal.

3. List the monthly surface water demand or projected demand if requesting a new appropriation (in acre-feet).

Month	*Diversion Amount*	*% of Water Returned*	*Monthly Demand*
January			0
February			0
March			7 Ac. Ft.
April			120 Ac. Ft.
May			750 Ac. Ft.
June			1300 Ac. Ft.
July			1700 Ac. Ft.
August			200 Ac. Ft.
September			1500 Ac. Ft.
October			

November			
December			
Totals			5,577 Ac. Ft.

B. *Conservation Practices*

1. Provide specific and quantified five-year and ten-year targets for water savings and the basis for development of such goals.

   Quantified five-year and ten-year targets are:

   a. 5 year goal 85 % system efficiency or save _____acre-feet

   b. 10 year goal 95 % system efficiency or save _____ acre-feet

   (Ex. System efficiencies 80 % sprinkler, 90 % LEPA, 95 % drip)

2. Describe the methods and/or device(s) within an accuracy of plus or minus 5% used to measure and account for the amount of water diverted from the supply source.

   There is a loss factor calculated for water transportation incurred in the District 6 system after water is diverted at the Rio Grande and prior to delivery to District 11. Water diverted from the Rio Grande for District 11 is calculated by multiplying the quantity of water delivered to District 11, as shown by the delivery meter, by 1.33

3. Provide a description of the leak-detection and repair, and water-loss accounting measures used.

   District staff monitors the water level of canals and resacas to ensure that water levels stay constant. If levels go below expected levels, an inspection is done to find the source of the problem. If repairs are needed, they are done immediately/

4. Equipment and/or process modifications used to improve water use efficiency:

   The district uses a meters to improve water use efficiency and calibrates the meters at least once a year.

5. Other water conservation techniques used:

   The constant removal of native vegetation and continual monitoring of canal structures to ensure water levels stay constant.

Best Management Practices

The Texas Water Developmental Board's (TWDB) Report 362 is the Water Conservation Best Management Practices (BMP) guide. The BMP Guide is a voluntary list of management practices that water users may implement in addition to the required components of Title 30, Texas Administrative

Code, Chapter 288. The Best Management Practices Guide broken out by sector, including Agriculture, Commercial, and Institutional, Industrial, Municipal and Wholesale along with any new or revised BMP's can be found at the following link on the Texas Water Developments Board's website: http://www.twdb.state.tx.us/conservation/bmps/index.asp

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact 512-239-3282.

BAYVIEW IRRIGATION DISTRICT #11's

DROUGHT CONTIGENCY

AND

WATER ALLOCATION PLAN

Section I: Declaration of Policy, Purpose, and Intent

The Board of Directors of the Bayview Irrigation District #11 (Bayview #11) deems it to be in the best interest of the District to adopt an Allocation Plan governing the equitable and efficient allocation of limited water supplies during times of shortage. These Rules and Regulations 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 11: User Involvement

Users of water from Bayview #11 are provided an opportunity to interject their views about the Allocation Plan by means of meeting with the General Manager and the Board of Director's during the District's regular scheduled monthly meetings at the district office, or by requested one-on-one meetings with the large users. Each year in September, the Board of Directors review the total useable water in Bayview #11's account. The Board sets the allocation on a per-acre basis. All irrigation users and landowners are sent a notice of any changes in the coming year's water allocation.

Section III: User Education

Information about the Plan is available and is provided to all water users upon request, including information about the conditions under which water allocation is to be initiated or terminated and the District's policies and procedures for water allocation. The District office provides upon request by the irrigation users a report of their balance remaining for that years allocation. This allows each farmer to manage the watering on each crop.

Section IV: Authorization

The Board of Directors authorize or authorizes and directs the General Manager to implement the applicable provisions of the 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 the Plan shall apply to all persons utilizing water provided by Bayview #11. 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 District's useable balance of water in the combined storage system of Falcon and Amistad reservoirs is equal to or less than 2 1/2 acre-feet per acre, of the total acres under flat rate assessment.

Section VII: Termination of Water Allocation

The Bayview #11 water Allocation Plan 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 exists.

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 letter to each irrigation user and landowner in the District.

Section IX: Water Allocation

(a) Upon initiation of water allocation, each irrigation user shall be allocated, on an acre-feet basis, water for each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each allocation account will be expressed in acre-feet of water

(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. Distribution will be on a pro rata basis, to each flat rate acre on which all taxes, fees, and charges have been paid. Notice will be given on the same basis as Section VIII.

(c) The amount of water charged against a user's water allocation will be metered per irrigation. Metered water deliveries will be charged based on actual measured use. It shall be a violation of the Plan for a water user to use water in excess of the amount of water contained in the users irrigation account.

(d) All unused allocations on December 31 of each year will be reallocated on January 1 of the following year.

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 user account to another. The transfer of water can only be made by the landowner or 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) Water from the District may not be transferred by a landowner for use outside the District. 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 35 percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered. The Landowner will pay District # 6's pumping charges for the water delivered, plus 15 percent of the water delivered for Bayview # 11 losses in it's system.

Section XI: 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 Water Code may be assessed an administrative penalty up to $ 5,000 a day under section 11.083 of the Texas Water Code. Additionally, if the violator is also taking, diverting, or appropriation of state water, the violator may be assessed a civil penalty in court of up to $ 5,000 a day. The violator may be sued for injunctive relief and civil damages in court by someone who is aggrieved by these violations.

Section XII: Severability

It is hereby declared to be the intention of the Board of Directors of Bayview Irrigation District #11 that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable. 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 of the 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 Allocation Plan is 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 Tem~ Codes Annotated*

Section XIV: Effective Date of Plan

The effective date of the Allocation Plan is August 24, 1999

Revised 2009

BOARD OF DIRECTORS
BAYVIEW IRRIGATION DISTRICT #11

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix G – Canal Ponding Test Results, Delta Lake Irrigation District, Edcouch, TX; TAMU July 2000

Canal Ponding Test Results
Delta Lake Irrigation District
Edcouch, Texas

July 2000

Prepared by:

Guy Fipps, Ph.D, PE
Professor and Extension Agricultural Engineer
Department of Agricultural Engineering
Texas A&M University
College Station, TX 77843-2117

Eric Leigh
Assistant Research Scientist
Department of Agricultural Engineering
Texas Agricultural Research and Extension Center
Weslaco, TX 78596

Ponding Test Results Summary

Seepage loss tests preformed in the Rio Grande Valley were extremely high, ranging from 90 to 1220 ac-ft/mi./yr. Generally, the highest seepage losses occurred in the smaller lined canals. High concrete canal seepage losses indicate that improper construction methods and materials are being used in the region and/or canals may have inadequate maintenance programs.
The unlined canals have seepage loss rates similar to those reported in the scientific literature by soil type, and range from 54 to 1037 ac-ft/mi./yr. We found no clear relation between visual condition and seepage loss for the unlined canals. However, for the lined canals, there was a clear relation, particularly for canals rated 5 or less (on a scale of 10).

Table 1. Ponding Test Results for Delta Lake Irrigation District

Test	Segments	Canal Type	Soil Type	Canal[1] Rating	Top Width (ft)	Length (ft)	Seepage Rate (gal/ft²/day)	Total Loss in Canal (ac-ft/mile) per day	per year[2]
1	A & A-12	lined	fine sandy loam	6.1	18	11405	3.63	0.98	293.79
2	A-11	lined	fine sandy loam	4.9	6	2552	5.32	1.03	308.55

[1] on a scale of 10 to 1.
[2] based on 300 days of operation per year.

Ponding Test Procedures

1) We walked the canal test section to measure the length using a measurement wheel. We also completed the canal rating survey, took photos, and looked for leaks occurring from open valves and/or large cracks that were not representative of the canal lining. Those were then sealed.

2) Five to 6 staff-gages were placed at equal distances along the canal test section. One location was equipped with a pressure transducer, which served as staff gage.

3) The canal test section was filled to normal operating capacity and shut down for the 24-hour test.

4) Before the test began, time was allowed to inspect and seal the check structures to prohibit any further flows into the test section. Check structures used include dirt dams, wooden side gates, and steel-plated valves. As additional sealant, dirt was back-filled around the check structures.

5) Staff-gage readings were taken from 4 to 5 times over the period of the 24-hour ponding test.

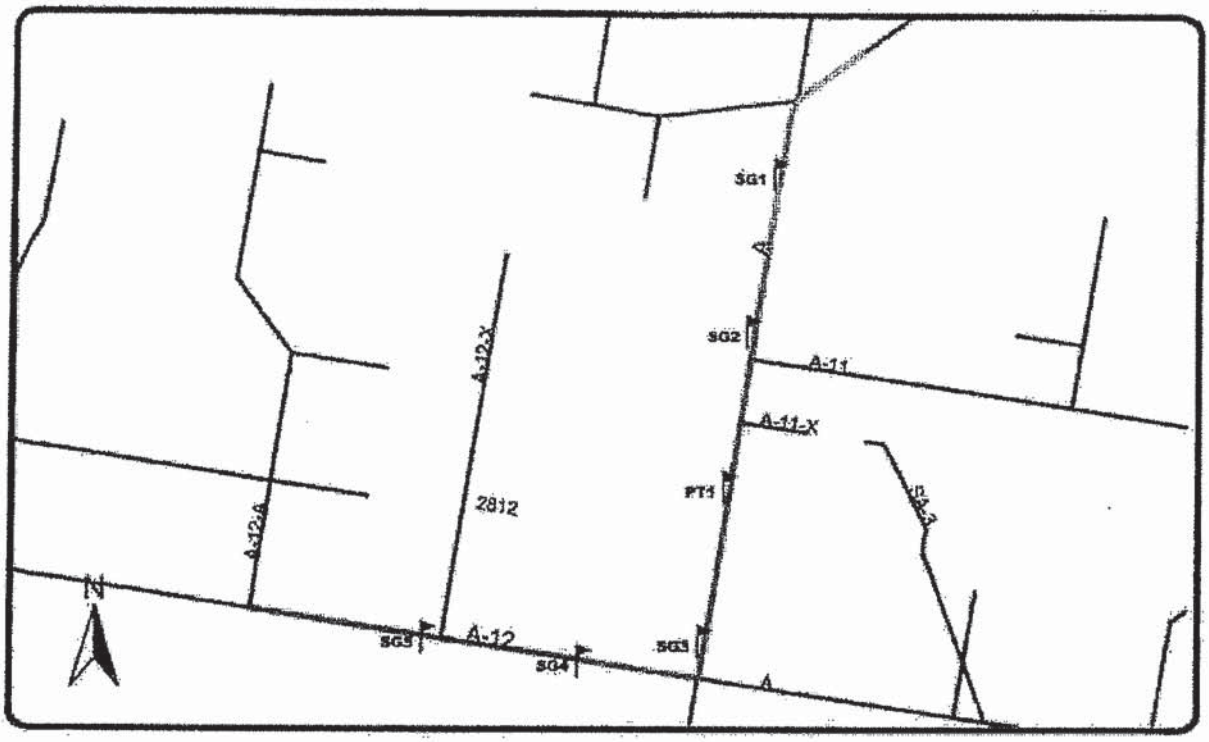
6) During the course of the test, canal dimensions were recorded including top width, bottom width, total depth, side slope angle, and cross-sectional shape. For earthen canals an average top width was calculated, and the bottom width estimated using the other canal dimensions.

Delta Lake Test 1

September 16 – 17, 1999

Delta Lake - Ponding Test 1

September 16-17, 1999



Staff Gage

Test Section

A

A-12

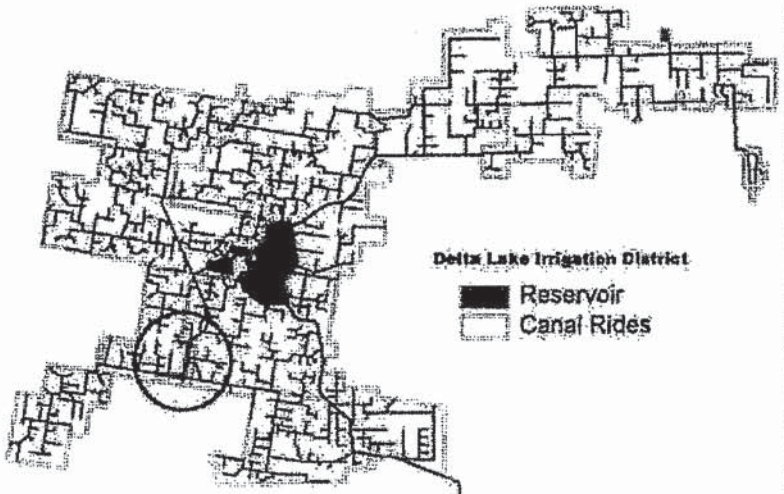
Conveyance System

canal

pipe

Roads

Projection: UTM, zone 14
Datum: NAD 83
Units: Meters



DMS Team, Agricultural Engineering
Texas A&M University
July 2000

0.6 0 0.6 1.2 Miles

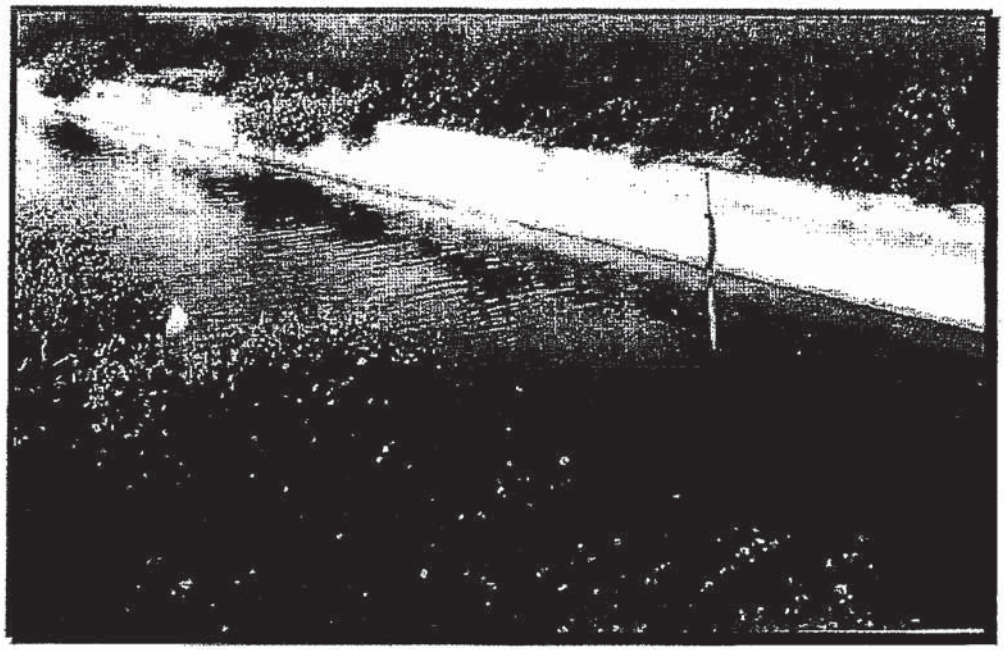


Table 2. Canal Rating[3]

Scale	lining condition	cracks/holes	frequency of cracks/holes	vegetation
1 to 5	3	4	1	3

Table 3. Rating Totals

Scale	Overall Rating
4 to 20	11
10 to 1	6.1

[3] See Canal Rating Chart in Appendix

Test 1. Information and Field Measurements

District: **Delta Lake Irrigation District**
Test ID: **Delta Lake 1**
Canal: **A & A-12** Lining Type: **Concrete**
Location: **Southwest of Monto Alto: RLP No.1**
Test Date: **September 16-17, 1999**
Start Time: **12:00pm** Finish Time: **12:30pm**

Canal Dimensions

Cross Section: **Trapezoidal**
Top Width(ft): **16.5 (A-12), 20 (A)**
Bottom Width(ft): **5.5 (A-12), 9 (A)**
Total Depth(ft): **6.0**
Side Slope: **1:1**
Segment Length(ft): **11405**
Soil Type: **fine sandy loam**
Overall Canal Rating: **6.1**

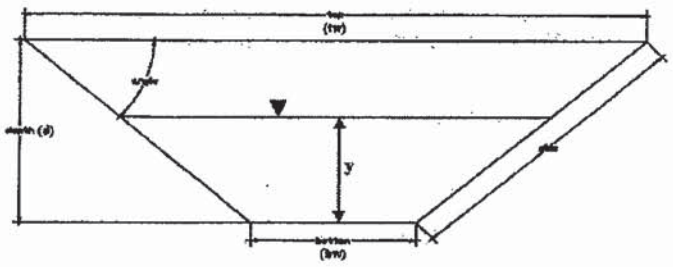


Table 4. Staff Gage Readings (feet above bottom)

Date	Time	SG1	SG2	PT1	SG3	SG4	SG5
16-Sept	12:00 PM	4.5417	4.75	4.9375	4.875	3.4375	3.625
	1:00 PM	4.5208	4.75	4.9375	4.875	3.4375	3.625
	4:00 PM	4.5208	4.75	4.9375	4.875	3.4167	3.625
17-Sept	11:30 AM	4.5	4.7292	4.9167	4.8541	3.3958	3.6041
	12:30 AM	4.5	4.7292	4.9167	4.8541	3.3958	3.6041
Segment Length (ft)		2400	1600	1600	1600	1600	2605

Table 5. Average Unit Area Loss Rate

$Ft^3/ft^2/hour$	Ft/day	In/day	$Gal/ft^2/day$	Acre-ft/mile/year[4]
0.0202	**0.4849**	**5.8188**	**3.627**	**293.79**

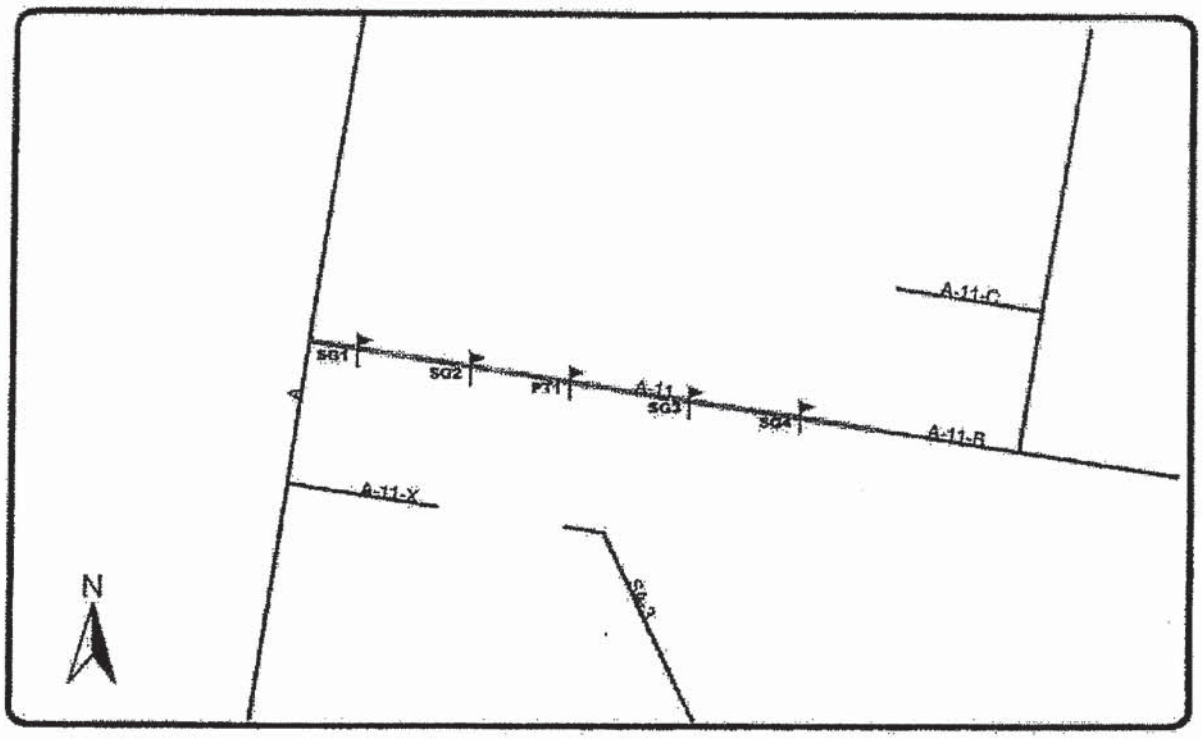
[4] Based on 300 days of operation per year.

Delta Lake Test 2

September 1999

Delta Lake - Ponding Test 2

September 22-23, 1999



Staff Gage

Test Section

A-11

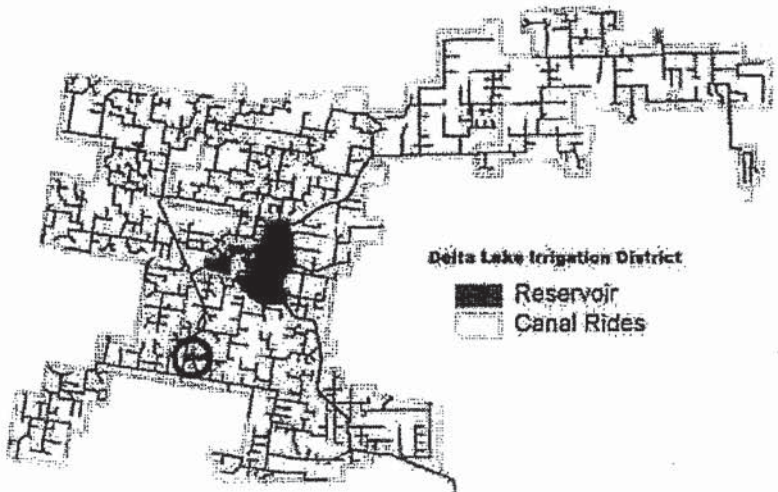
Conveyance System

canal

pipe

Roads

Projection: UTM, zone 14
Datum: NAD 83
Units: Meters



DMS Team, Agricultural Engineering
Texas A&M University

July 2000

0 0.2 0.4 0.6 0.8 Miles

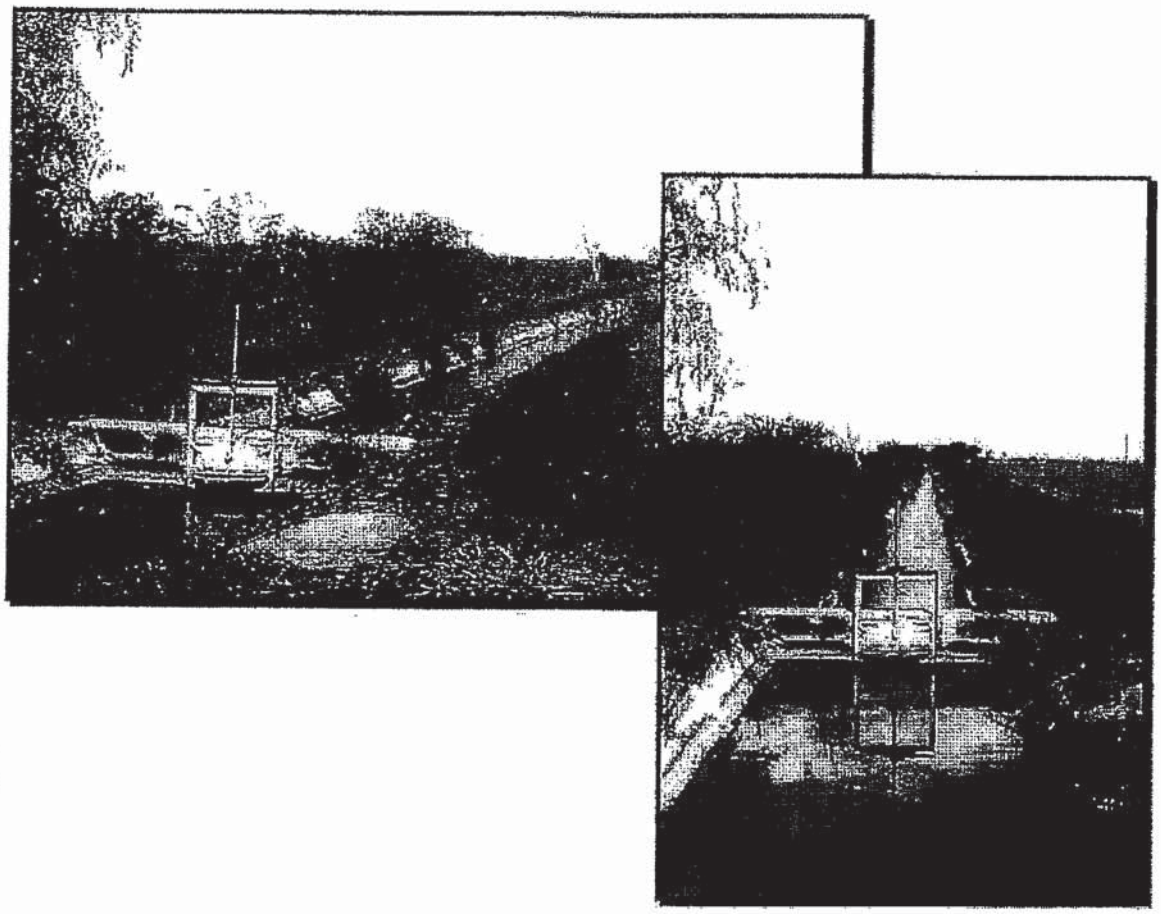


Table 6. Canal Rating[5]

Scale	lining condition	cracks/holes	frequency of cracks/holes	vegetation
1 to 5	3	3	3	3

Table 7. Rating Totals

Scale	Overall Rating
4 to 20	12
10 to 1	4.9

[5] See Canal Rating Chart in Appendix

Test 2. Information and Field Measurements

District: **Delta Lake Irrigation District**
Test ID: **Delta Lake 2**
Canal: **A-11** Lining Type: **Concrete**
Location: **Southwest of Monte Alto off of canal segment A**
Test Date: **September 22-23**
Start Time: **5:00pm** Finish Time: **5:00pm**

Canal Dimensions

Cross Section: **parabolic**
Top Width(ft): **6.25**
Total Depth(ft): **4.0**
Segment Length(ft): **2552**
Soil Type: **fine sandy loam**
Overall Canal Rating: **4.9**

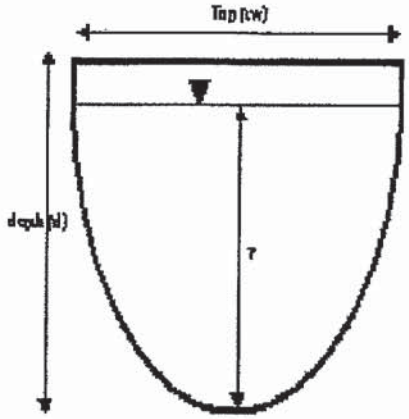


Table 8. Staff Gage Readings (feet above bottom)

Date	Time	SG1	SG2	PT1	SG3	SG4
22-Sept	5:00 PM	2.5417	2.5417	2.5417	2.5833	3.0833
23-Sept	9:30 AM	1.8125	1.7917	1.8333	1.875	2.3958
	12:00 PM	1.7917	1.7708	1.8125	1.8125	2.375
	4:30 PM	1.75	1.6667	1.75	1.7917	2.25
Segment Length (ft)		495	500	510	535	512

Table 9. Average Unit Area Loss Rate

$Ft^3/ft^2/hour$	Ft/day	In/day	$Gal/ft^2/day$	Acre-ft/mile/year[6]
0.0296	**0.7107**	**8.5284**	**5.316**	**308.55**

[6] Based on 300 days of operation per year.

Acknowledgements

DMS TEAM

Support provided by the DMS (District Management System) team of:

Stewart Beall, Research Agricultural Technician (former)
Kenneth Carpenter, Research Agricultural Technician (former)
Bryan Treese, Computer Programmer (former)
Raul Garcia, Student Technician (former)
Craig Pope, Extension Assistant

DELTA LAKE IRRIGATION DISTRICT

The district office personnel and canal riders provided helpful planning and assistance in canal ponding testing.

Bayview Irrigation District #11

Main Canal Pipe Conversion, Phase 1
Water Conservation Through Improved Efficiency and Reliability

Appendix H – PRO-21 PVC Pipe Specification Data and Loading Chart

PRO-21™ PVC PIPE

Diamond "PRO-21" closed profile pipe is produced by extruding an "I-beam" type profile that is in turn wrapped onto a circular mandrel providing a continuous tube with a helical heat welded seam. The result is a pipe of solid wall appearance from the inside and outside which has the structural advantages of the "honeycomb or I-beam"construction internal to the pipe wall itself. This results in a product which meets the performance requirements of a solid wall while providing the advantage of lighter weight. Diamond "PRO-21" meets all requirements of ASTM F1803.

Diamond's Closed Profile Pipe is made with PVC compounds that meet the requirements for cell class 12364 as described in ASTM D1784. Integral bell sockets meet the requirements of ASTM D3212. Pipe gaskets meet the requirements of ASTM F477.

PRO-21™

SPECIFICATION DATA FOR PS46 PRO-21 IS SUPPLIED IN 14 FOOT LAYING LENGTHS

Nominal Pipe Size in. (mm)	Average Outside Diameter Inches	Bell Outside Diameter Inches	Mininum Inside Diameter Inches
PIPE DIMENSIONS PRO -21 ASSEMBLY MARKS ARE AT 7" MINIMUM (ASSEMBLY MARK 1) AND 9" MAXIMUM (ASSEMBLY MARK 2)			
30" (750)	31.606	35"	29.410
33" (825)	35.036	38-1/2"	32.405
36" (900)	38.036	41-3/4"	35.395
42" (1050)	44.200	48-1/2"	41.375
48" (1200)	50.570	55"	47.360
54" (1350)	57.100	61-1/2"	53.350
60" (1500)	63.932	69-1/2"	59.340

SHORT FORM Specification for PVC Sewer Pipe. Pro-21 PVC Gravity Sewer and Drain Pipe Sizes 30" - 60"

All sanitary sewer and storm drain pipe shall be Diamond Plastics Pro-21 PVC profile wall sewer pipe made of compounds meeting the minimum cell classification of 12364 as defined in ASTM D1784 and manufactured in accordance with ASTM F 1803. It shall have a smooth interior and exterior. It shall have a gasket with four sealing fins and a resilient wedge bevel. The joint shall meet all the requirements of ASTM D3212. All PVC sewer pipe shall be installed in accordance with ASTM D2321, Uni-Bell's Uni-Pub 6 and the manufacturer's recommendations.

PRO-21™

F1803 LOADING CHART

Nominal Pipe Size in. (mm)	Average Outside Diameter	Pieces Per Bundle	14' Length Pieces Per Truckload	*Feet Per Truckload
30" (750)	31.606	3	27	378
33" (825)	35.036	2	12	168
36" (900)	38.036	2	12	168
42" (1050)	44.200	2	12	168
48" (1200)	50.570	1	12	168
54" (1350)	57.100	1	6	84
60" (1500)	63.932	1	3	42

Prices are subject to a firm policy of "Price in effect at time of shipment on regular purchases"
"Possession of this page does not constitute an offer of sale"