WaterSMART: Water and Energy Efficiency Grants for
FY2015 – Funding Group I

Cameron County Irrigation District No. 6
Conversion of the Saldaña Canal into Pipeline,
Elimination of the Saldaña Pump by Construction of Aerial
Crossing, Solar Powered Second Lift Pump,
Refuge Outlet and Water Marketing

District Manager:
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Los Fresnos, TX 78566
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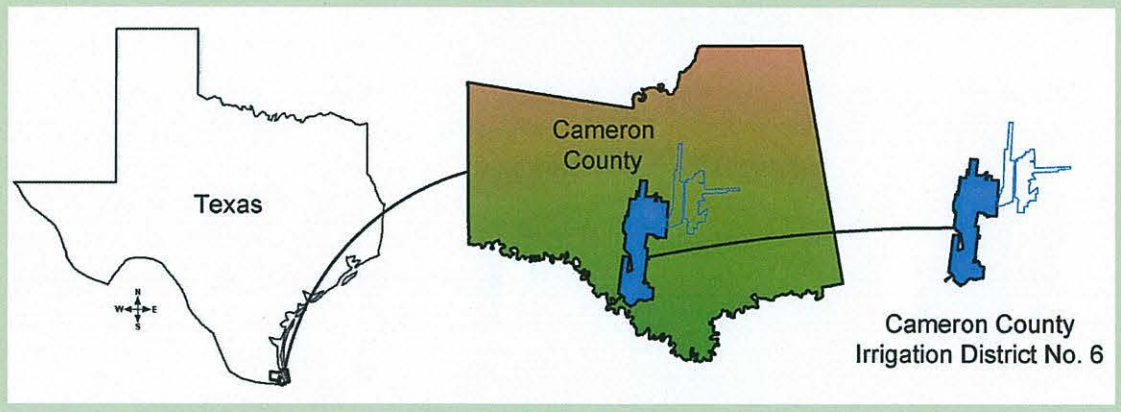

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Firm Registration No. F-897

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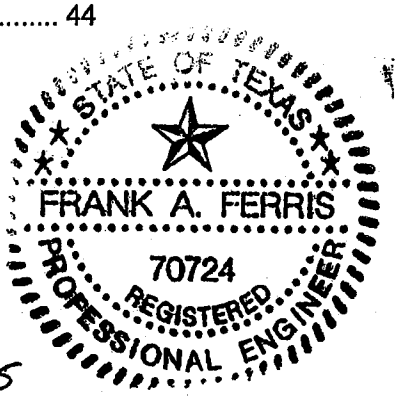

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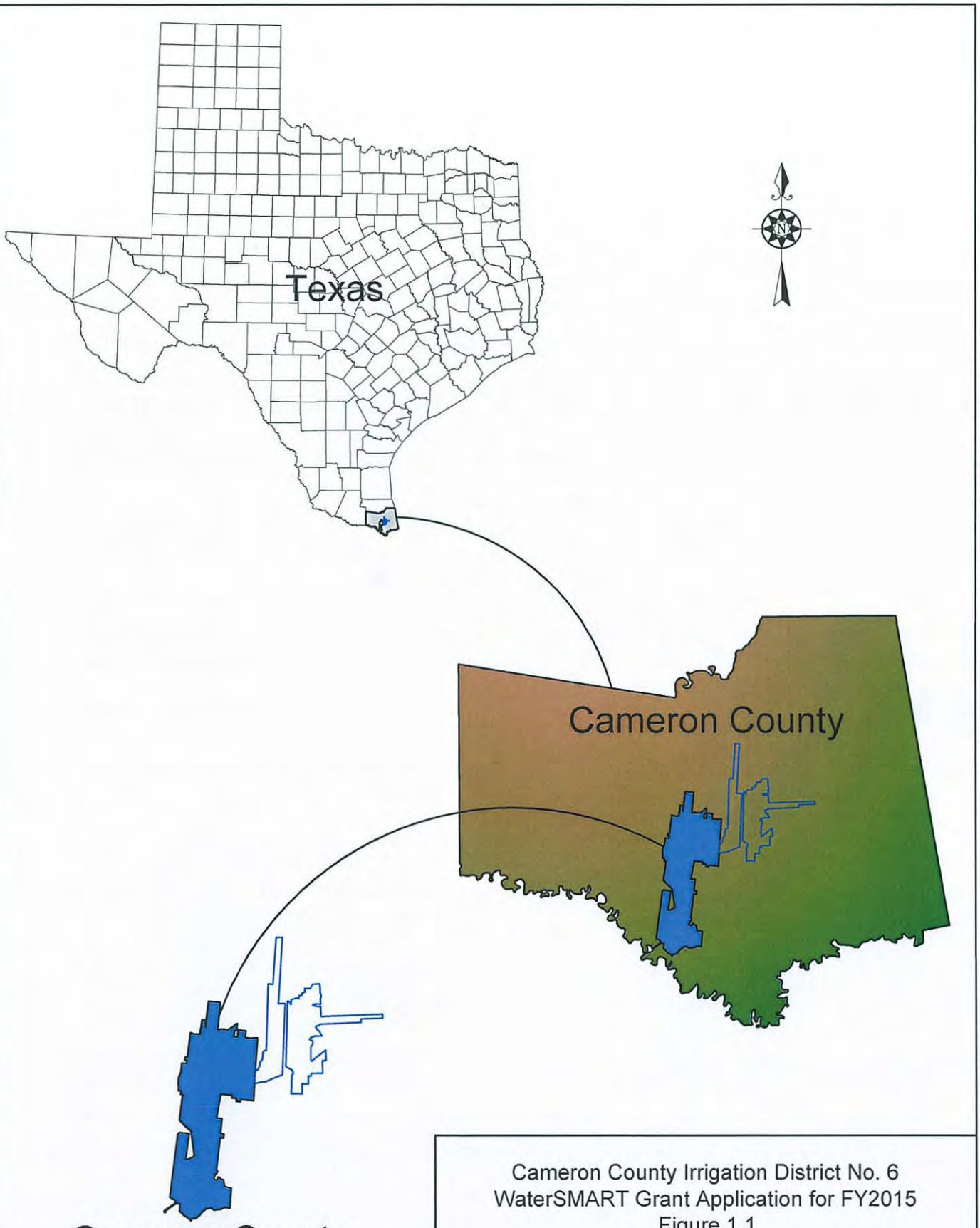
(1) Technical Proposal: Executive Summary
Date: January 8, 2015
Applicant: Cameron County Irrigation District No. 6
32343 FM 803, Los Fresnos
Cameron County, Texas

The Cameron County Irrigation District No. 6 (District) is proposing a Funding Group I Project to conserve water and energy. The project will result in conservation of 275 acre feet per year of water and 53,000 kilowatt hours per year of conventional energy. The Project accomplishes Task "A" Water Conservation by placement of the 3,800 foot long Saldaña Canal into Pipeline resulting in the conservation of 275 acre feet per year. Task "B" Energy Water Nexus is achieved in three ways. By simply conserving water, the District no longer has to pump the conserved water resulting in conservation of 4,000 kWh per year. The elimination of the inefficient Saldaña Pump Station by construction of a new aerial crossing will result in the conservation of 44,500 kWh per year. The construction of a Solar Powered Second Lift Pump will replace approximately 4,600 kWh per year of conventional power. The sum of the three Task "B" energy conservation items will amount to 53,000 kWh per year of conventional electric energy that will be eliminated. An outlet will be constructed to serve the US Fish and Wildlife Service (USFWS) Lower Rio Grande Valley National Wildlife Refuge (LRGVNWR) to allow the USFWS to better manage their resources. The LRGVNWR benefits several endangered and threatened species including the Ocelot and Jaguarundi, thereby accomplishing Task "C". The District is an active participant in the Lower Rio Grande Valley Watermaster System Water Markets. It actively markets excess allocation to water users in need and will market the conserved water. Furthermore, the Refuge Outlet will result in an agreement with the USFWS to deliver its water in exchange for a transfer of USFWS water allocation for use by the District, resulting in additional water marketing to satisfy Task "D". Finally, the District is converting all its agricultural water rights to a mixed use that allows for mining use and agricultural use; this will allow the District to sell excess allocation for mining use. This project should be completed within 18 month of Contract execution. Since the project is ready to proceed and can be started October of 2015, completion should occur by May of 2017. All of the proposed construction will occur on District property with the exception of the end of the Refuge Outlet Pipeline which will be on the Lower Rio Grande Valley National Wildlife Refuge. A portion of the project will be funded in the amount of $150,000, about 19.5%, by the Texas Water Development Board through its Agricultural Grants Program. An additional benefit of the Texas Water Development Program, not required by the BOR, is an education and outreach component. The District is requesting a Federal Share of 39%. The project may begin immediately upon Grant Agreement execution.

(2) Background Data
Cameron County Irrigation District No. 6 (the District) is located in the Lower Rio Grande Valley Region with its main office located in Los Fresnos, Texas. Figures 1.1 – 1.3 provides a general location map of the District as well as the proposed improvements. The District boundary encompasses 33,400 acres. The District currently serves 17,800 acres of irrigated farmland where farmers grow citrus, vegetables, sugar cane, sorghum, corn and hay.



Cameron County Irrigation District No. 6
WaterSMART Grant Application for FY2015
Figure 1.1
Location Map
Job No.: 408-004 Date: 01/07/2015

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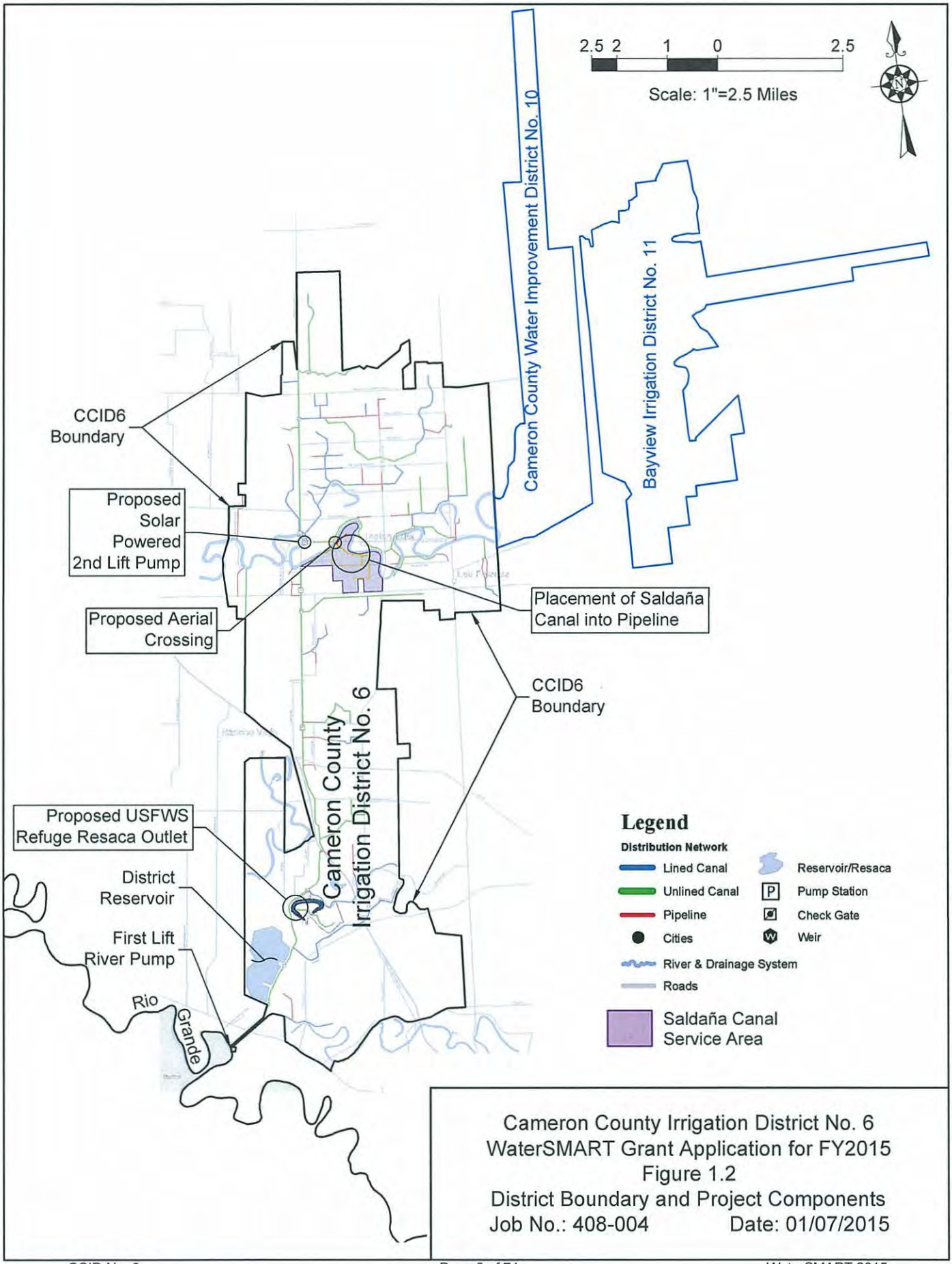

Cameron County Irrigation District No. 6
WaterSMART Grant Application for FY2015
Figure 1.2
District Boundary and Project Components
Job No.: 408-004 Date: 01/07/2015

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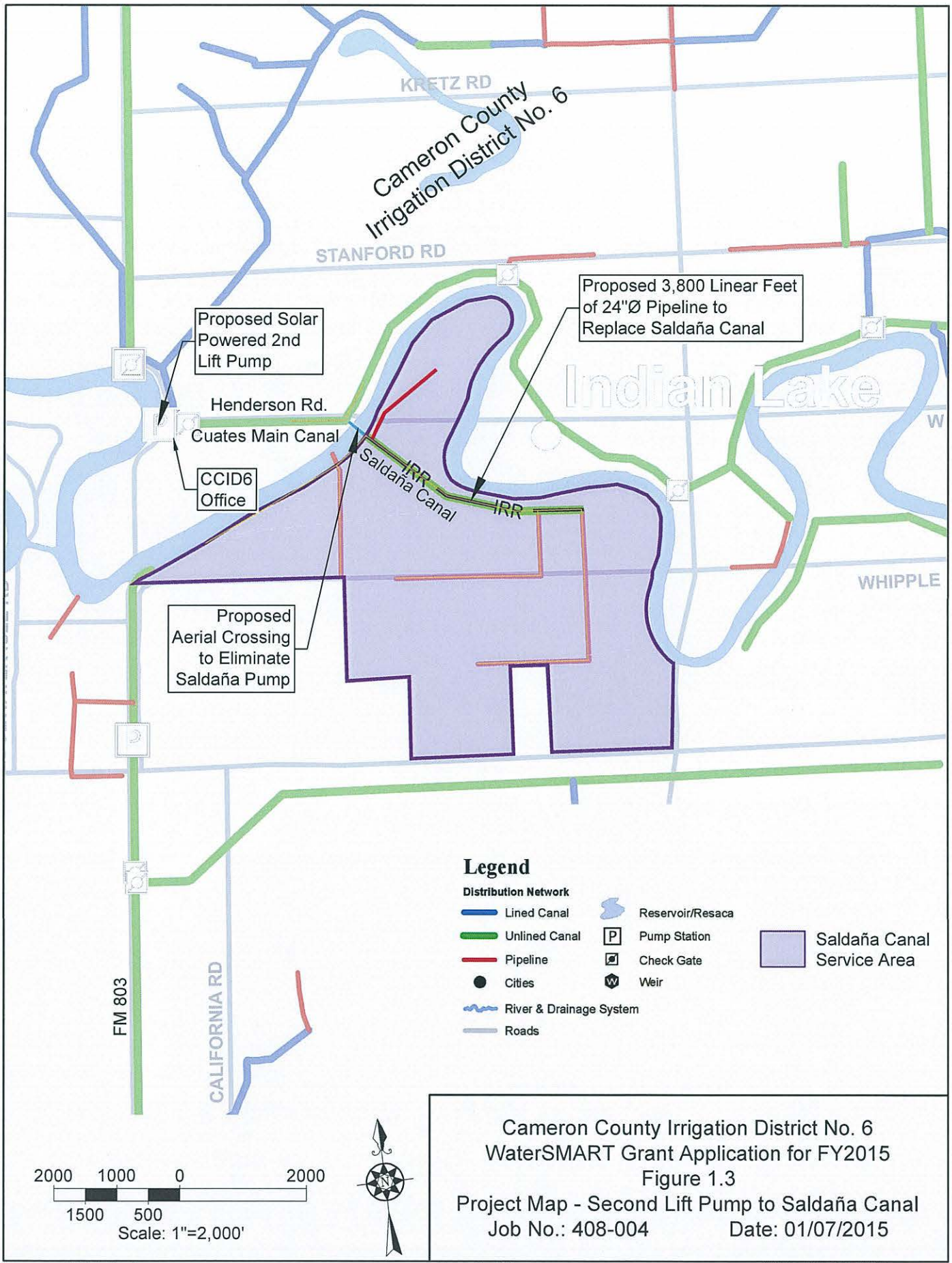
KRETZ RD
Cameron County Irrigation District No. 6
STANFORD RD
Proposed Solar Powered 2nd Lift Pump
Proposed 3,800 Linear Feet of 24"Ø Pipeline to Replace Saldaña Canal
Indian Lake
Henderson Rd.
Cuates Main Canal
CCID6 Office
IRR
Saldaña Canal
IRR
WHIPPLE
Proposed Aerial Crossing to Eliminate Saldaña Pump
Legend
Distribution Network
Lined Canal
Unlined Canal
Pipeline
Cities
River & Drainage System
Roads
Reservoir/Resaca
Pump Station
Check Gate
Weir
Saldaña Canal Service Area
FM 803
CALIFORNIA RD
2000 1000 0 2000
1500 500
Scale: 1"=2,000'
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Cameron County Irrigation District No. 6
WaterSMART Grant Application for FY2015
Figure 1.3
Project Map - Second Lift Pump to Saldaña Canal
Job No.: 408-004 Date: 01/07/2015
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The District provides raw water to the potable water suppliers of the City of Los Fresnos and Olmito Water Supply Corporation. The District diverts and delivers irrigation water for Cameron County Water Improvement District No. 10 (District 10) and Bayview Irrigation District No. 11 (District 11).

Table 1 provides a history of water diverted by the District from 2001 through 2013. The District diverted an average of 35,000 acre feet, of that 11,300 was diverted for downstream customers. District 10 is an irrigation customer and maintains about 8,000 acre feet of water rights. District 11 is an agricultural customer of District 6 and maintains approximately 17,000 acre feet. Olmito Water Supply Corporation and the City of Los Fresnos maintain approximately 1,546 acre feet and 1,051 acre feet of municipal water rights, respectively. The District occasionally diverts water for the Brownsville Public Utilities Board, under their Excess Use 1838 Permit. The District, being one of the last diverters on the Rio Grande prior to the Gulf of Mexico, often takes advantage of the "No Charge" Diversions where excess flow in the river may be diverted without being charged against the District's storage allotment in the Rio Grande Watermaster System. Over the past five (5) years, the District has averaged 3,450 acre feet of "No Charge" Diversions. The District actively markets allocation to other irrigators and Districts in need. Over the past three years the District has sold over 33,700 acre feet of allocation to those agricultural customers in need.

Table 1
Historical Diversions

Year	Charge Diversions (Acre Feet)	No Charge Diversions (Acre Feet)	Customer Diversions (Acre Feet)	Total Diversions (Acre Feet)
2013	18,798	2,435	13,133	34,366
2012	14,700	4,823	14,069	33,592
2011	31,511	2,047	12,461	46,019
2010	15,079	5,879	2,567	23,525
2009	31,511	2,047	14,314	37,704
2008	16,646	4,337	9,796	30,779
2007	7,344	1,153	5,794	14,291
2006	16,154	3,627	*9,743*	*29,524*
2005	23,396	1,276	*12,152*	*36,824*
2004	6,788	4,036	*5,331*	*16,155*
2003	8,702	5,285	*6,889*	*20,876*
2002	13,391	6,881	*9,985*	*30,257*
2001	12,871	5,202	*8,902*	*26,975*
5 Year Average 2009-2013	22,320	3,446	11,309	35,041
Average	16,684	3,771	9,626	29,299

Note: Numbers in italics are estimated based the average customer diversions at 33% of total diversions for the years 2007-2013.

All water right holders along the Rio Grande below Amistad Dam are part of the Lower Rio Grande Valley Watermaster System. The system is over allocated and is susceptible to long term drought, due to a watershed in a semi-arid region. This situation is further complicated by the fact that the US Share is subject to a treaty with Mexico that allows Mexico to defer water deliveries up to five years in the amount of 350,000 acre feet per year. The result is a system susceptible to extreme drought. The system has been adjudicated; therefore, irrigation water right holders are equally distributed available water after municipal and industrial water right holders have been accounted for. The US share of storage in the Amistad-Falcon System is currently at 47.5% of its 3,390,000 acre feet conservation capacity. The system is considered in the third year of a drought that began in 2012. The last drought, where reservoir levels sank this low, about ten (10) years ago, lasted for nine (9) years. The area continues to grow, so water conservation improvements are imperative to long term water resource management. Currently, the District owns water rights to divert water from the Rio Grande in the amount not to exceed 49,565 acre feet per year for irrigation purposes. Over the past five years, the District has diverted from the Rio Grande an average of 35,000 acre feet for all purposes, including its clients.

The District's delivery system begins with the First Lift Plant that consists of an existing 400 cubic feet per second (cfs) pumping facility to be augmented by a new 180 cfs pumping facility. The First Lift Plant is located along the Rio Grande (shown in Figure 1.2). The District maintains a 1,800 acre foot Reservoir that is located about two (2) miles north of the River Pump Station along the District's Main Canal. Downstream of the District's reservoir, eight (8) miles of main canal lead to the Resaca de los Cuates which the District utilizes as a second reservoir and a supply source for its Second Lift Pump. The Resaca de los Cuates has a valuable storage capacity of about 700 acre feet. The District's Second Lift Pump Station consists of two natural gas powered pumps and one electric driven pump. The two gas driven pumps are rated for about 60 and 40 cfs while the electric pump is rated for about 30 cfs. The District's delivery system includes 71 miles of open canal and 20 miles of underground pipeline. The District's current First Lift Pump Station utilizes conventional electricity. The station is about 80 years old and is not very efficient. The District is constructing a new River Pumping facility that will be powered entirely by natural gas engines.

This new facility is expected to have an overall (including hydraulic losses) efficiency of 69% when compared to the existing electric driven pumping facility's overall efficiency of 53%. The new facility should be in operation by the end of 2015. This information and more is available from "New River Pump Station Engineering Report," Ferris & Flinn, LLC, October 2013. The River Pumping Facility will require 675,000 kWh per year of power to pump about 35,000 acre feet per year. The District's Second Lift Pump Station is powered primarily by natural gas engines. In periods of light demand, an electric driven pump is utilized. The electric driven pump utilizes about 50,000 kWh per year. The natural gas pumps require about 500,000 kWh per year of equivalent unconverted gas energy. The Saldaña Pump, to be eliminated by this project facility, is extremely inefficient. The calculated overall efficiency of this station is about 14% including hydraulic losses. The pump station utilized approximately 22,500 kWh per year of conventional electricity in 2013.

After elimination of this station, water will be pumped through the more efficient Second Lift Station and the New Solar Powered Second Lift Pump resulting in conservation of about 44.5 kWh per year.

District 6 changed managers in 2012. Prior management did not pursue system improvements, thus; there is no record of the District working with the Bureau of Reclamation in recent history. The District is, however, a member of the Rio Grande Regional Water Authority that participated in the "Lower Rio Grande Basin Study," prepared by the BOR in 2013. Current management, however, recognizes the need and benefit of water and energy conservation and has acquired a NADBank grant for the New River Pump Station and a Texas Water Development Board Agricultural Conservation grant to assist with the completion of this project. The District looks forward to a long relationship with the Bureau to accomplish water and energy conservation projects in the future.

(3) Technical Project Description

(a) General Description

This project consists of water and energy conservation and other components that meet the goals of the 2015 WaterSMART Funding Opportunity Announcement. The first component of the project is the placement of the 3,800 foot long Saldaña Canal into PVC pipeline to conserve 275 acre feet per year. The second component of the project is the construction of an aerial Resaca crossing to eliminate the inefficient Saldaña Pump. The third component is the construction of a Solar Powered Second Lift Pump to replace conventional electric power and satisfy demands of local nurseries during periods of low demands. A fourth component of the project is the construction of an outlet to the LRGVNWR to benefit the Ocelot as well as other endangered species. Water Marketing will be accomplished by executing an agreement with the USFWS to deliver their water in exchange for water allocation. In addition, the District will convert all of its agricultural water to mixed use to allow for sale of excess allocation for mining purposes.

The first component of the project is to place the Saldaña Canal into pipeline to accomplish Task "A", water conservation. The pipeline will be 24" PVC pipeline that will have no measureable losses. This canal was originally a main canal that served a much larger area. The east end of the canal included a Resaca Crossing that was eventually eliminated and rerouted. Water losses include seepage into the ground, evaporation from the surface and evapotranspiration from vegetation on the banks of the canal. Seepage tests were performed on the canal to establish the losses due to seepage. Evaporation was estimated utilizing the "Monthly Reservoir Evaporation Rates for Texas 1940 through 1965," by the Texas Water Development Board, 1967. The canal operates about 60 days out of the year. Each time the canal is filled to serve a customer, the volume of the canal is lost to seepage and evaporation.

The water conservation estimate assumes about 60 days of seepage and evaporation plus the volume of the canal times about 30 fillings of the canal that will be lost when it is not in use. The result is about 275 acre feet in lost water annually that will be conserved upon placing the canal into pipeline. The Water Conservation estimate is presented in Table 2. The detailed test results are provided in Appendix "A". The existing Saldaña Canal, when full, has a surface area of 2.5 acre feet and a volume of 6.1 acre feet. The measured seepage loss was 1.5 acre feet per day.

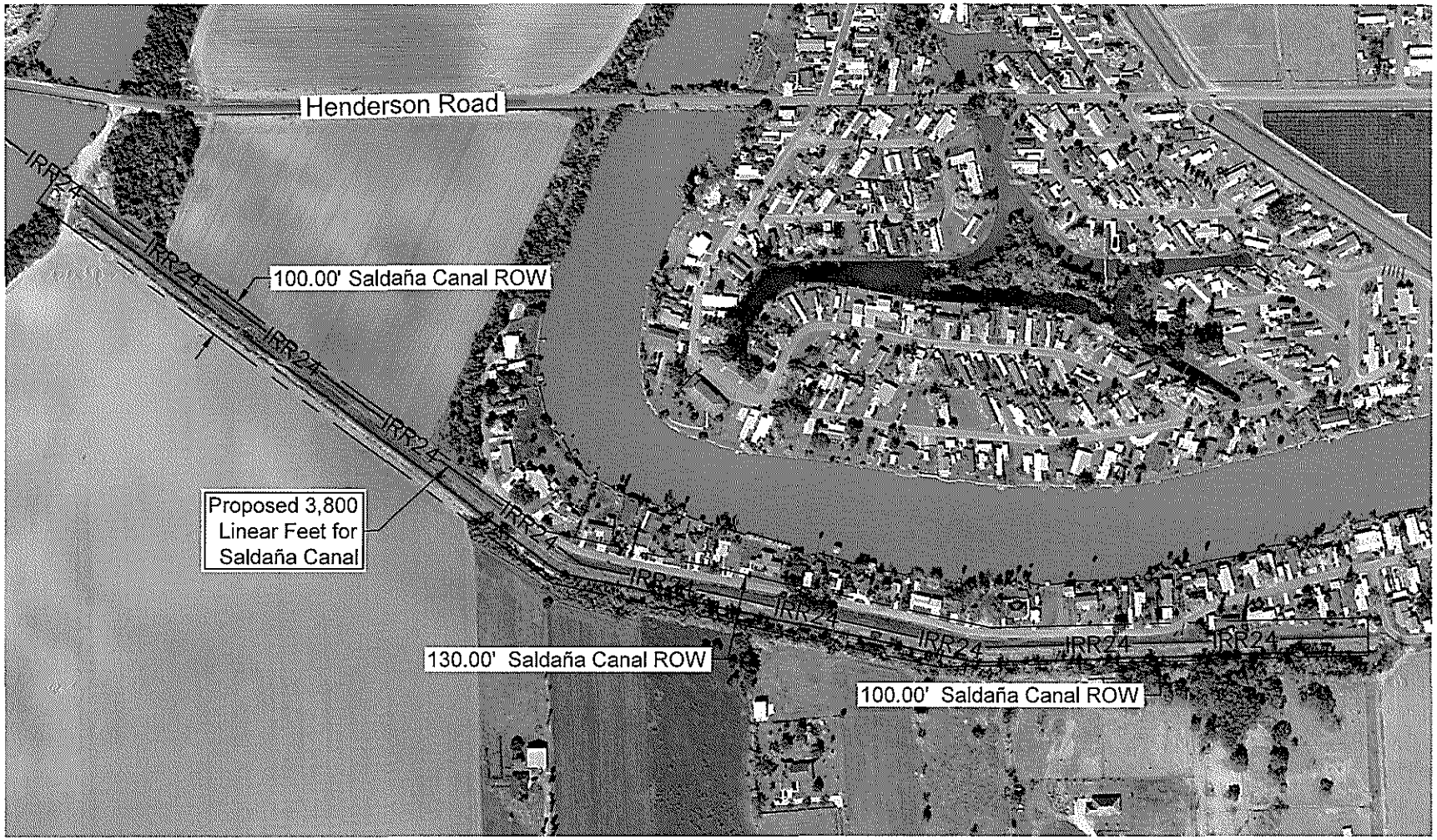
In contrast, the proposed 24" pipeline has a volume of 0.27 acre feet and negligible losses. Figure 2.1 is an aerial view of the proposed canal to be placed into pipeline. Figure 2.2 provides cross sections of the Saldaña Canal and the proposed placement of the pipeline. A 24" meter is proposed to help measure actual usage through the new PVC pipeline to further document water savings.

Figure 2.3 is a view of the Saldaña Canal on the day of the test. Figure 2.4 is the evaporation bucket and measuring gauge utilized for the test. One test gauge was placed at each end of the canal to account for wind effects.

Table 2
Water Conservation Estimate

Saldaña Canal Surface Area	2.49	Acres
Saldaña Canal Volume	6.06	Acre Feet
Average Depth	2.43	Feet
Measured Seepage	1.53	Acre Feet per Day
Estimated Evaporation during	4	Feet per year
Irrigation Periods when Canal is	0.011	Feet per Day
full	0.03	Acre Feet per Day
Total Canal Losses when operating	1.56	Acre Feet per Day
Number of Days operating per year	60	Days
Operating Seepage and Evaporation Losses	93	Acre Feet
Number of times canal is filled per year	30	
Canal Volume	6.06	Acre Feet
Losses in canal from filling to use	182	Acre Feet
Total Water Conservation Estimate	275	Acre Feet

A second component of this project is the construction of the aerial crossing of the Resaca to eliminate the Saldaña Pump. The Saldaña Pump lifts water out of the Resaca de Los Cuates storage reservoir and pumps it into the Saldaña Canal. Figure 3.1 is an aerial view of the proposed aerial crossing. Figure 3.2 is a sketch of the proposed aerial crossing. The aerial crossing will consist of a 24" diameter steel pipeline on concrete piers to connect the Cuates Main Canal fed by the Second Lift Pump Station to the Saldaña Canal. Figure 3.3 is a photograph of the Saldaña Pump Station with the Resaca to be crossed in the background. Remnants of an old aerial crossing are visible. There is no information as to when the Saldaña Pump station was constructed. An aerial history on Google Earth revealed that the station existed in 1962, so it is at least 50 years old.



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300 100
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Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 2.1
Placement of Saldaña Canal Into Pipeline - Aerial View
Job No.: 408-004 Date: 01/07/2015

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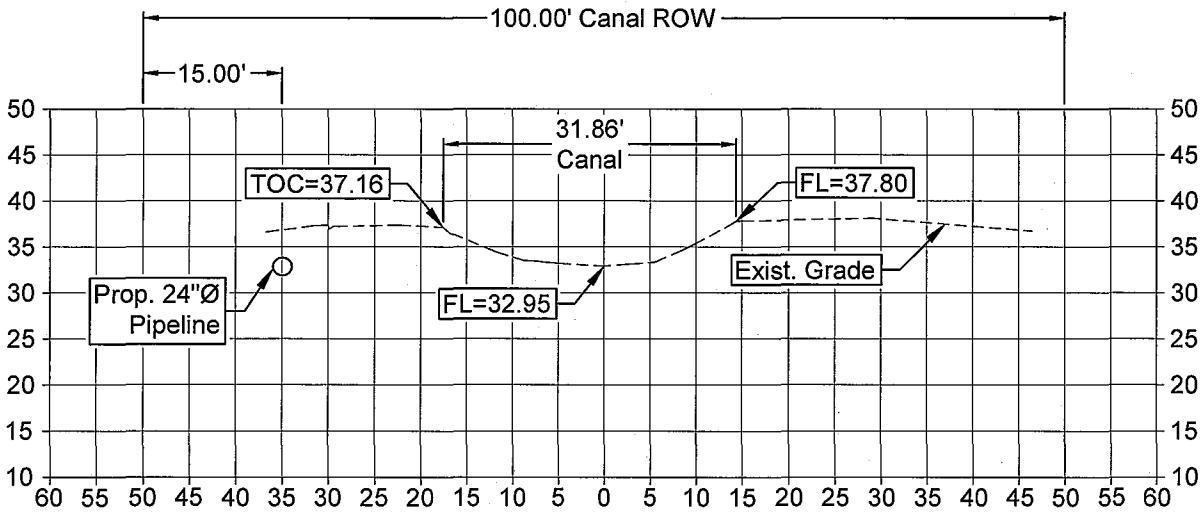

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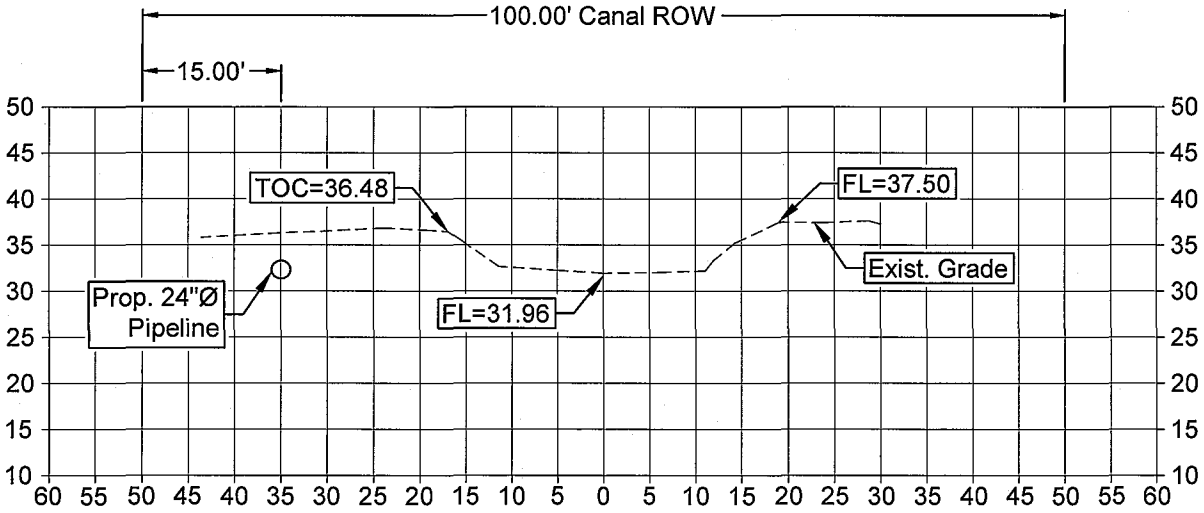
Saldaña Canal
Horizntal Scale: 1"=20'
Vertical Scale:1"=20'



Typical X-SEC 36+00.00
Saldaña Canal
Horizntal Scale: 1"=20'
Vertical Scale:1"=20'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 2.2
Placement of Saldaña Canal Into Pipeline
Cross Sections
Job No.: 408-004 Date: 01/07/2015

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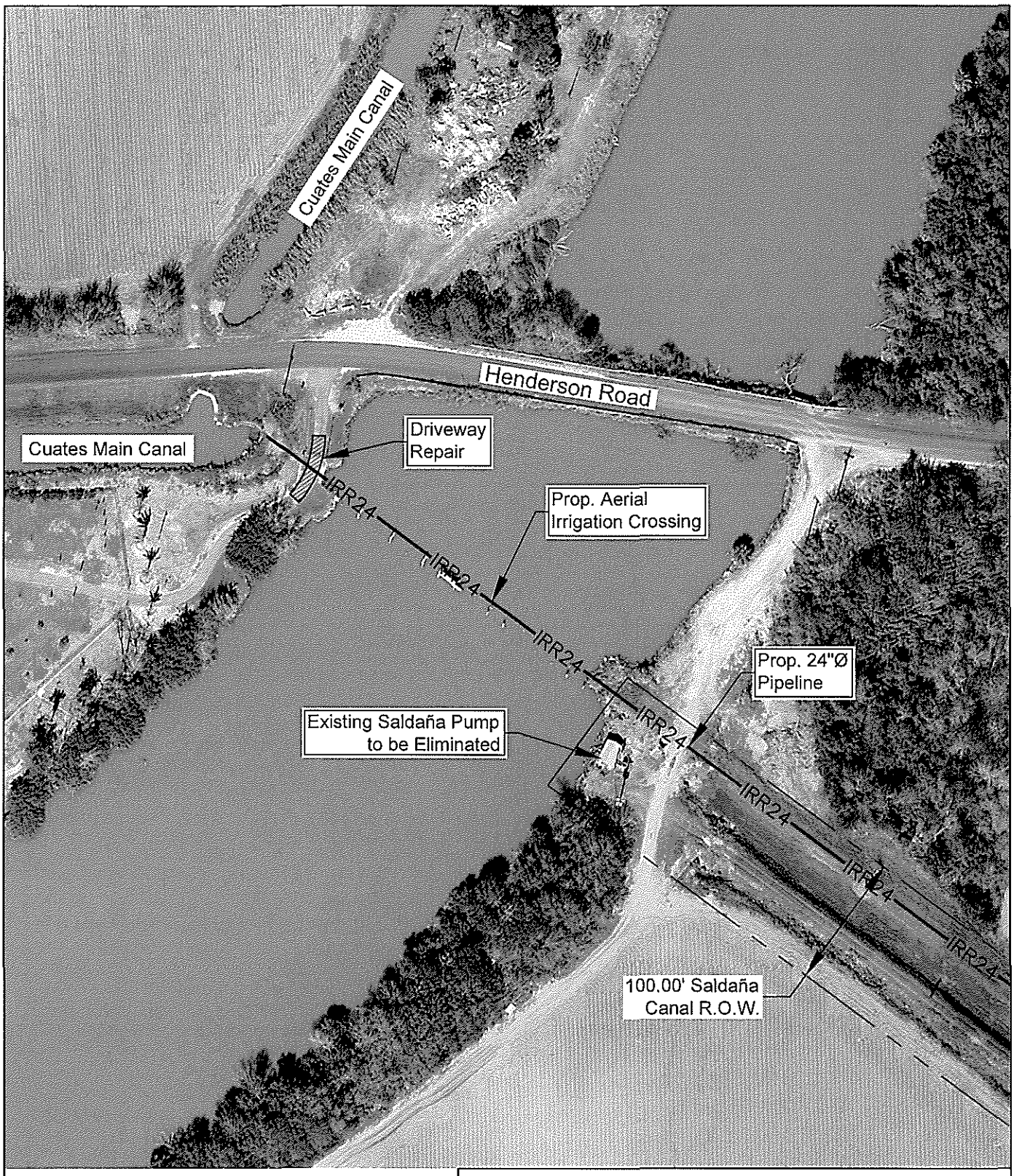
Figure 2.3 Saldaña Canal on Date of Test

Figure 2.4 Test Staff Guage with Bucket to Measure Evaporation

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 2.3 & 2.4
Job No.: 408-004 Date: 01/07/2015



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Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 3.1
Proposed Aerial Crossing - Plan
Job No.: 408-004 Date: 01/07/2015

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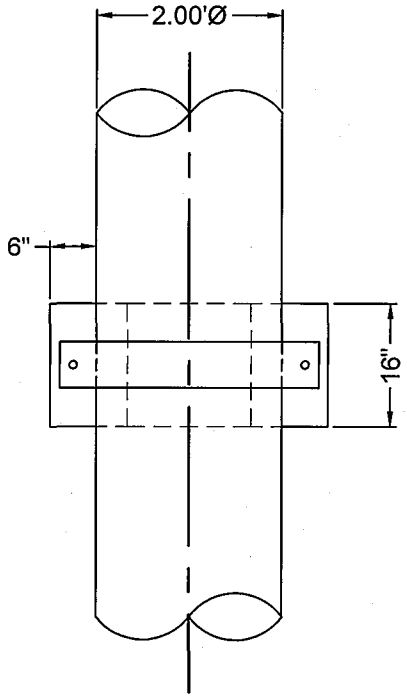
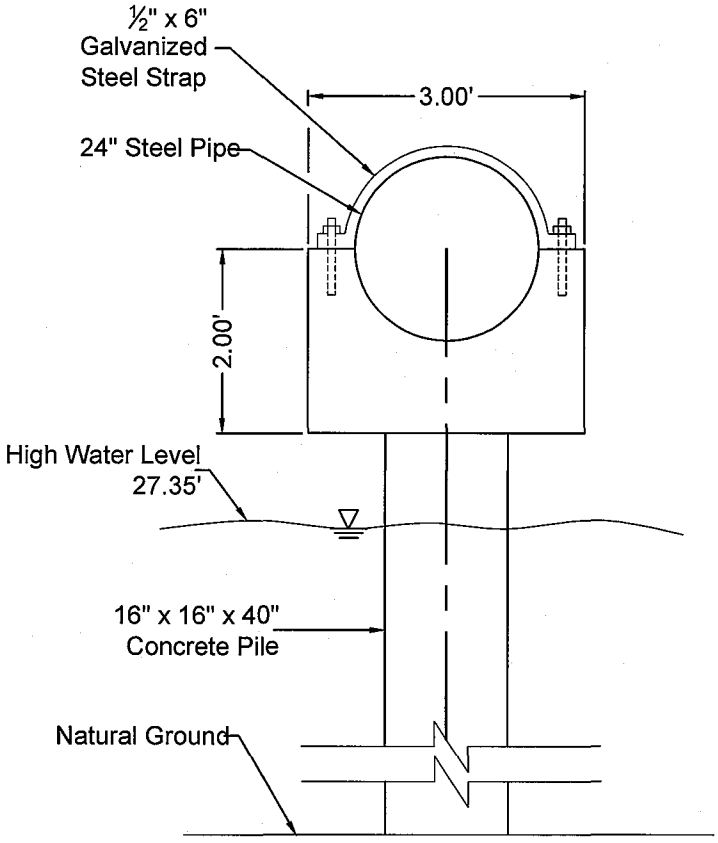


Aerial Crossing
Plan View
Scale:1"=2'



Aerial Crossing
Profile View
Scale:1"=2'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 3.2
Proposed Aerial Crossing - Details
Job No.: 408-004 Date: 01/07/2015

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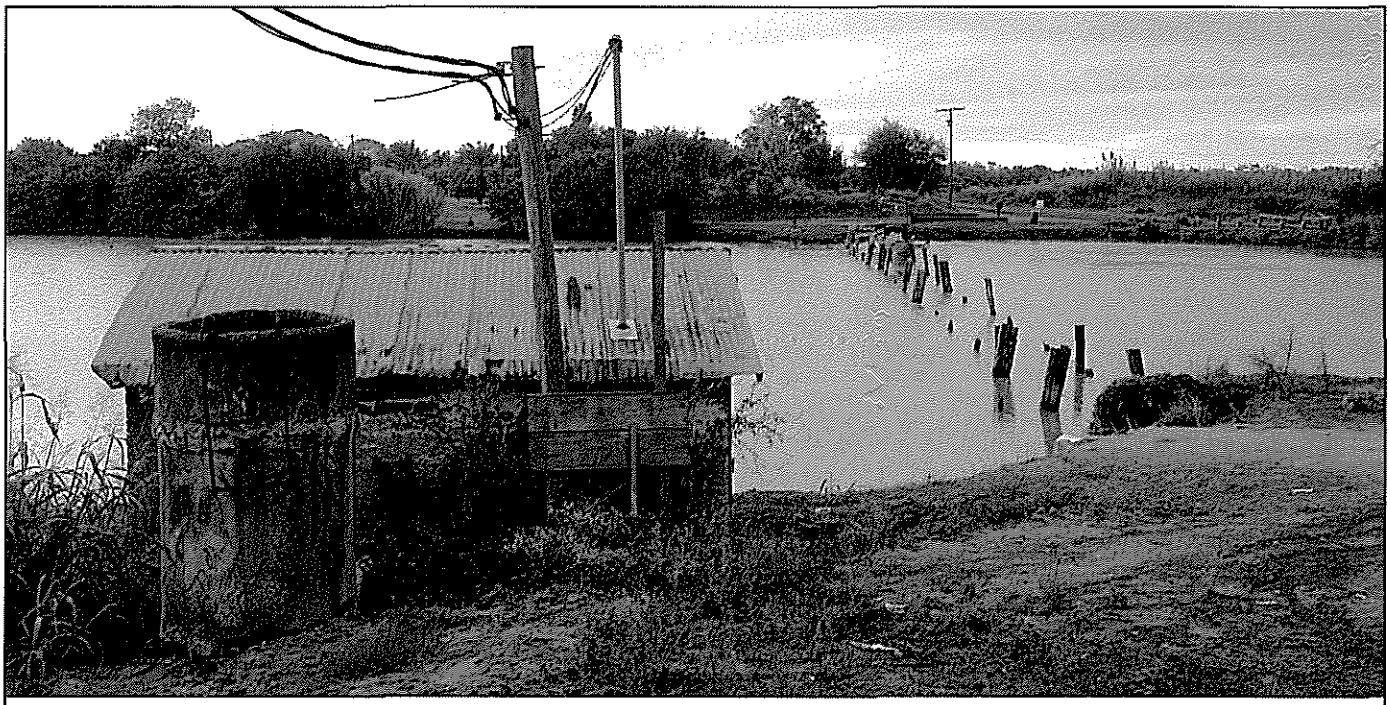

Figure 3.3 - Saldaña Pump Station - Exterior

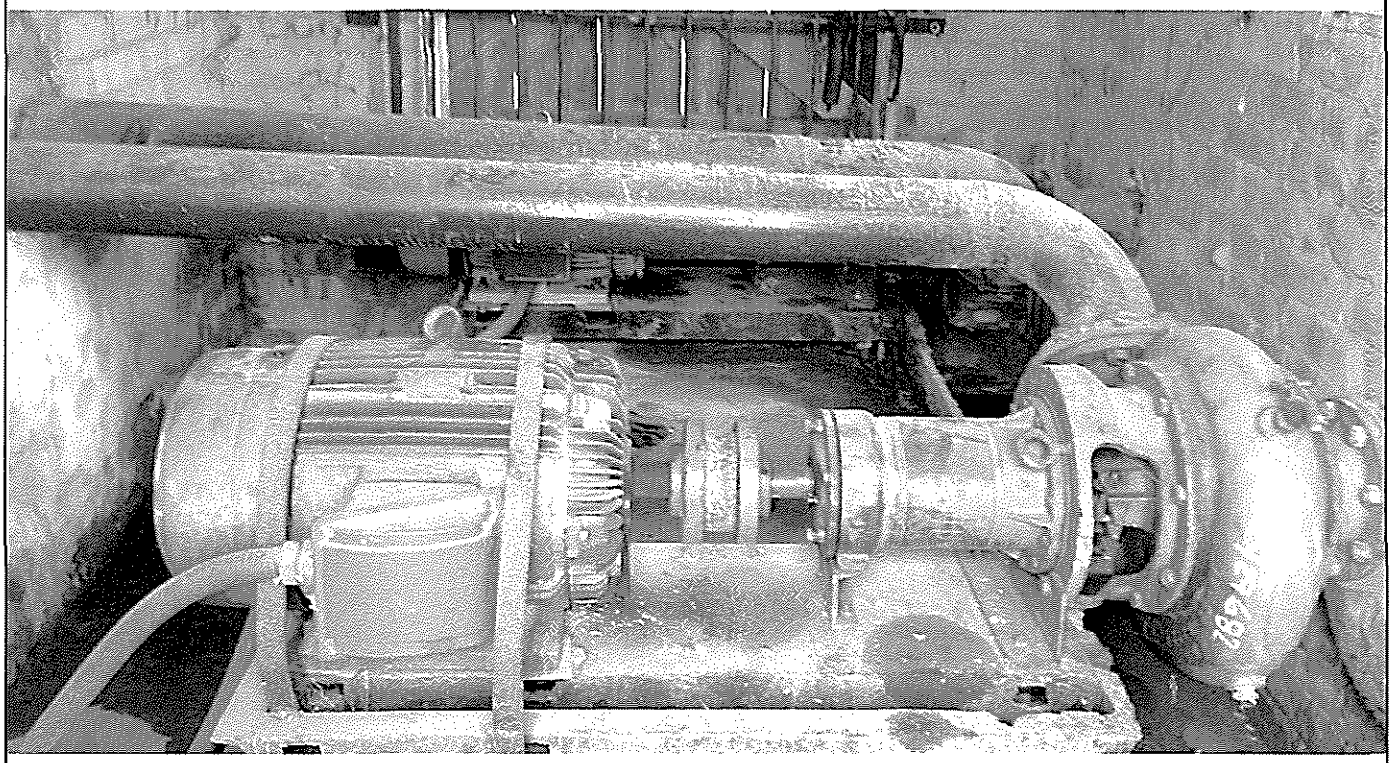

Figure 3.4 - Saldaña Pump Station - Interior

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 3.3 & 3.4
Job No.: 408-004 Date: 01/07/2015

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The Saldaña Pump Station is extremely inefficient. Table 3 provides a review of the Saldaña Pump electricity records in 2013. Over that same period, it is known from District records that 459 acres were irrigated out of the Saldaña Pump. The kilowatt demand on the electric bills combined with the kilowatt hours of consumption on the electric bills allows one to calculate how many days the pump station was operating and the equivalent horsepower draw on the electric meter.

Considering the acreage watered, the duration the pumps ran and adding canal losses, it was determined that the station pumps at a rate of 2,400 gallons per minute (gpm). Considering the lift is only about ten feet from the Resaca to the Saldaña Canal, a water horsepower of 6.06 Hp is required to lift 2,400 gpm ten feet, but the electric bills reveal an electricity demand of 45 horsepower. The overall Saldaña Pump station efficiency, comparing water horsepower to electric demand horsepower is 14%. The cause of the large inefficiency is unknown, but it could be, the foot valves, mismatched pumps, small discharge lines, inefficient motors or all of the above. Elimination of the station will result in substantial energy and labor cost savings when the source of the water to the Saldaña Canal is through the Second Lift Pump Station. This component is part of the project's accomplishment of Task "B". A 24" gate will be added at the end of the Cuates Main Canal for control purposes and repair of the existing driveway east of the canal prior to the aerial crossing will be included in the cost.

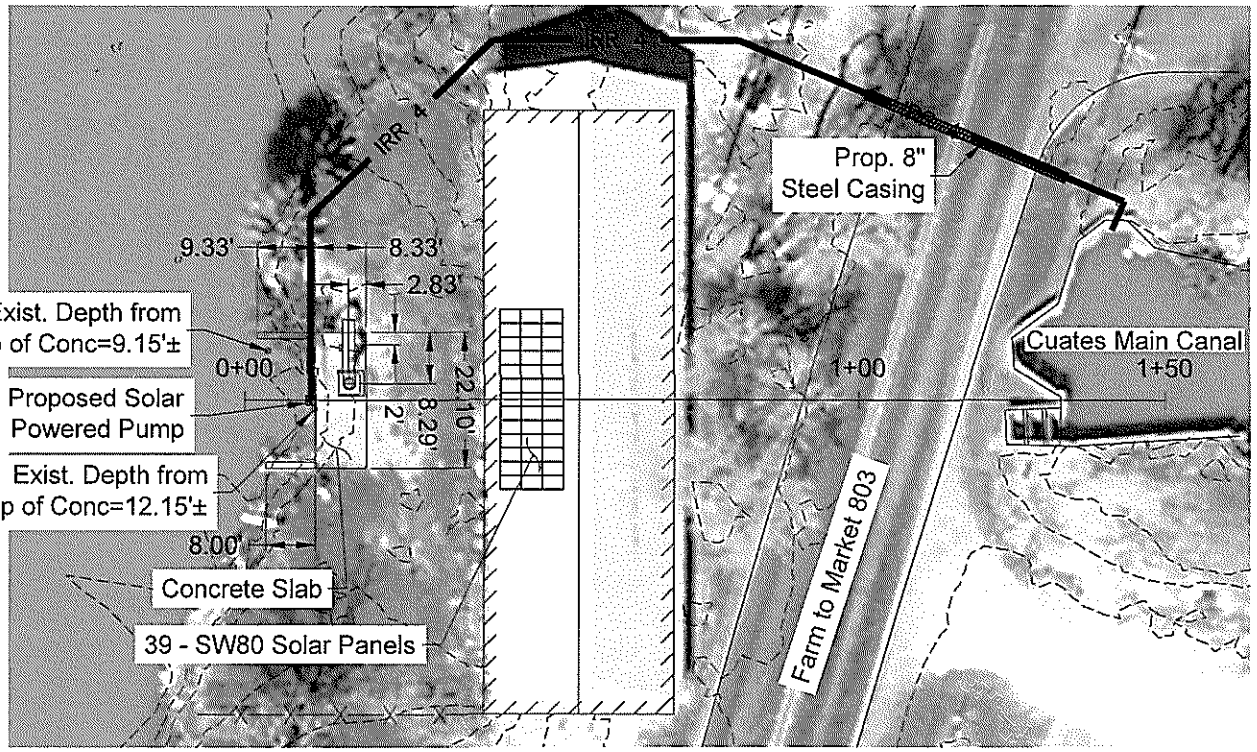
A third component of the project is the addition of a solar powered pump at the Second Lift Pump Station. The renewable powered pump will not only help accomplish Task "B", it will fulfill a need the District has to supply a few nursery customers during periods of low demands. During periods of high demand, the District operates the natural gas driven pump for days at a time. This natural gas driven pump is the most efficient and cost effective pump to run but it can supply up to twenty irrigation outlets at once. When there is little irrigation demand, a few nursery customers require the District to start the electric pumps for a few hours at a time. The Solar Power Second Lift Pump should be able to help with demand during these low demand periods and reduce the time the electric pump must be started. The Solar Powered Pump will also lift water from the Resaca de Los Cuates storage to the Cuates Main/Saldaña Pipeline anytime the sun is shining, so it will always perform useful work replacing conventional power.

Figure 4.1 shows the proposed Solar Powered Pump to be constructed at the Second Lift Pump Station. Appendix "B" provides detailed information on the Grundfos Solar Powered Pump. The pump is the largest Solar Powered Pump that Grundfos makes. It is a 60 SQF-3 that will produce an average of 44,148 gallons per day with a peak pump rate of about 80 gallons per minute when the sun is shining. There will be 39-80 watt solar panels placed on the Second Lift roof to power the pump. The total average water production is expected to be 16,120,000 gallons per year or about 50 acre feet per year. The solar powered pump will be placed in a removable 12" well screen set into the Second Lift Intake Structure. A 4" PVC discharge will be used and it will cross FM 803 through an 8" steel casing and discharge into the Cuates Main Canal. The District will need to periodically clean the 12" well screen designed to keep foulants out of the pump. A control system is furnished with the pump and panels. A structural engineer will design the mounting system to attach the panels to the roof.

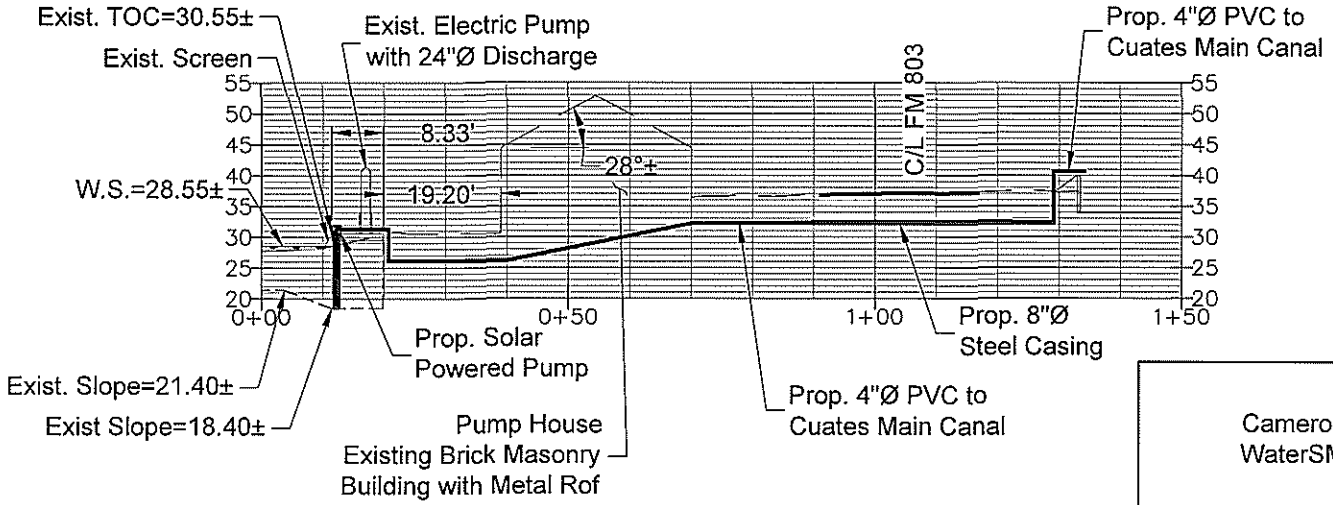
Table 3
Saldana Pump Electricity Records

Date	Amount	Demand (Kw)	Consump-tion (Kwh)	Total Cost per Kwh	Days of Operation	Horse-power Draw
1/10/2013	$692.33	38.53	1,481	$0.467	1.6	52
2/10/2013	$231.51	32.15	191	$1.212	0.2	43
3/11/2013	$611.32	51.343	3,957	$0.154	3.2	69
4/10/2013	$277.05	35.884	605	$0.458	0.7	48
5/9/2013	$180.80	8.44	6	$30.133	0.0	11
6/10/2013	$526.11	31.18	3,452	$0.152	4.6	42
7/10/2013	$783.43	38.224	6,502	$0.120	7.1	51
8/8/2013	$446.63	34.12	2,696	$0.166	3.3	46
9/9/2013	$527.89	39.002	3,596	$0.147	3.8	52
9/10/2013	$180.23	6.652	65	$2.773	0.4	9
11/6/2013	$183.16	9.151	35	$5.233	0.2	12
12/9/2013	$185.57	11.592	13	$14.275	0.0	16
Total	**$4,826.03**		**22,599**	**$0.214**	**25.2**	

Average Horsepower Draw for Months operating more than 1 day	45	Hp
In 2013, the Saldana Pump Station watered	459	acres
at a depth of	6	inches
in	25.2	days
equals	9.11	Ac.Ft./day
plus canal losses	1.5	Ac.Ft./day
equals pump rate	10.61	Ac.Ft./day
	2,400	gpm
lift	10	feet
required water horsepower	6.06	Hp
Overall Saldana Pump Station Efficiency (Electric Demand to Pumped Water)	14%	
Electricity Cost per Acre Irrigated	$ 10.51	per acre
Total Aacre Feet Pumped in 2013	268	Acre Feet
Consumption per Acre Foot	84.41	Kwh/ac.ft.



Plan
2nd Lift Pump Station
Scale: 1"=30'



Profile
2nd Lift Pump Station
Horizontal: 1"=30'
Vertical: 1"=30'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 4.1
Solar Powered Pump Plan & Profile
Job No.: 408-004 Date: 01/07/2015

F:\0408 Cameron County Irrig. Dist. #6\408-004 Saldana Canal\2015 Watersmart Grant\DWG\408-004 WaterSMART.dwg, 408-004 Fig 4.1 to 4.4, 1/20/201

The panels will be attached to the west side of the roof to keep them out of sight and inaccessible to thieves. Figure 4.2 and 4.3 show the detail for the proposed Solar Powered Pump. Figure 4.4 is a photograph of the Second Lift Pump Station showing how the Solar Powered Pump will be arranged into the site. The pump will operate anytime the sun has adequate power.

A fourth component of the project is construction of an outlet with a metering well and pipeline to provide water to the Fish Hatchery Unit of the United States Fish and Wildlife Service Lower Rio Grande Valley National Wildlife Refuge (USFWS LRGVNWR). Information on such can be found in Appendix "C". The LRGVNWR has a substantial amount of water rights, but does not have the facilities in place to deliver the water to the needed locations. The District has the capability to construct the improvements which helps accomplish the endangered species goal of the WaterSMART program.

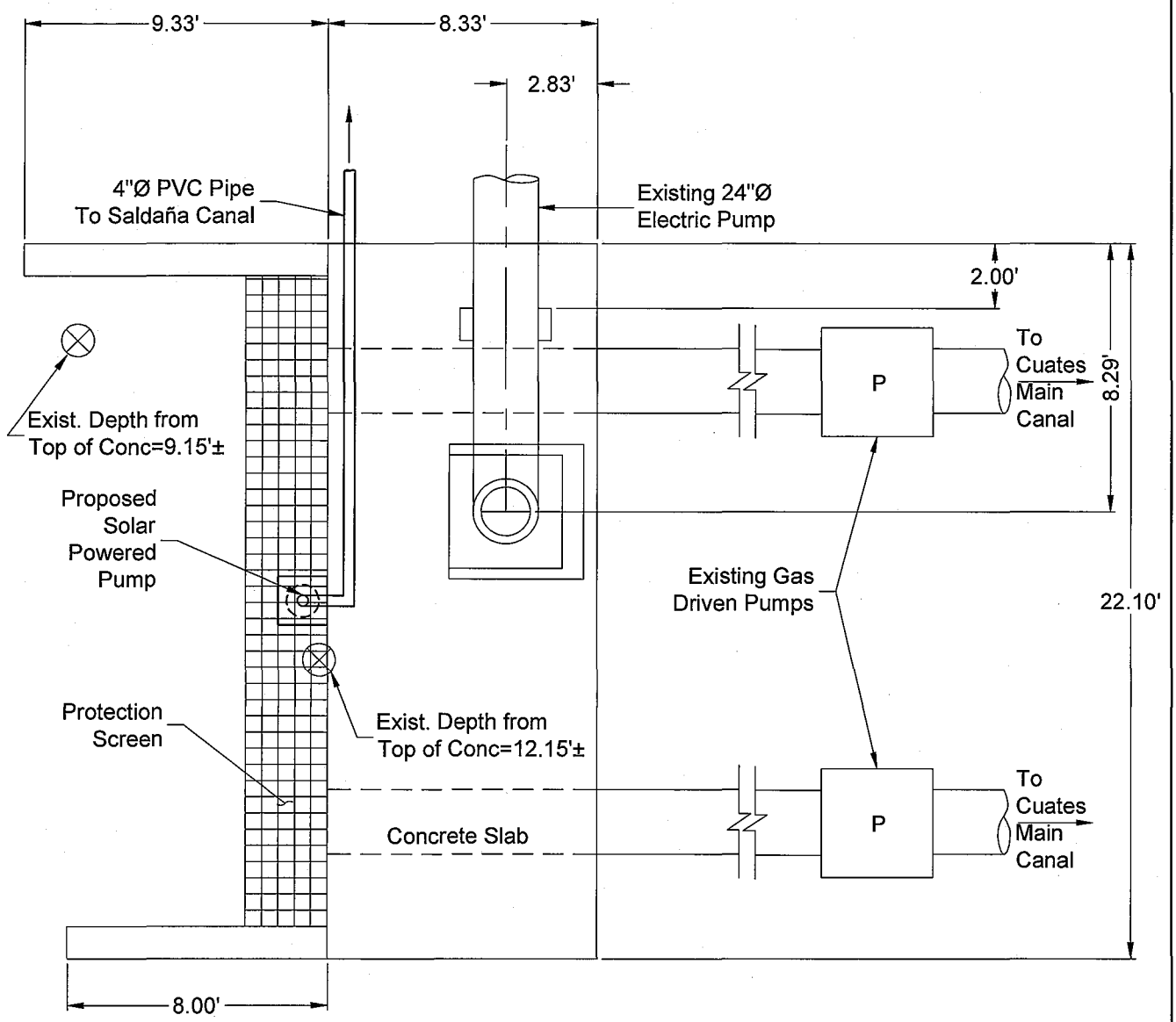
The USFWS LRGVWR provides habitat for supporting 19 federally threatened and endangered species and 57 state protected species. The refuge provides habitat for the Ocelot and Jaguarundi, federally listed endangered cat species, which will benefit from the increased ease of water manageability from the proposed outlet. The proposed outlet accomplishes Task "C".

After the flooding of 2010, the refuge realized the benefits the flood flow had on the floodplain wetlands and vegetation. The Rio Grande has been so well managed from a flood and construction standpoint that flow rarely exceeds the main channel since construction of Falcon Dam. Prior to construction of the dam, the river would often flow over its banks and fill wetland areas. With the new outlet constructed by Cameron County Irrigation District No. 6, the Refuge can simulate flood conditions that historically occurred often. The simulated flooding will improve diversity and overall health of habitat cover and food chain.

Figure 5.1 is an aerial map of the proposed refuge outlet location and the LRGVNWR Fish Hatchery Tract. There is an existing 24" canal gate on the main canal that feeds a 24" line under the Resaca to irrigate lands east of the Resaca. The tract has been fully reforested; therefore, there is no need for water to the east. The District will sleeve the existing 24" with an 18" PVC, install a new gate and construct a meter well and outlet into the Resaca. The proposed facilities are shown in Figures 5.2, 5.3, and 5.4. Figure 5.5 is a photograph taken in the bed of the Resaca near the outlet location looking north.

The capacity of the USFWS portion of the Resaca is about 40 acre feet. The estimated annual usage is expected to be about 75 acre feet. Downstream of the USFWS Resaca is the Texas Parks & Wildlife Fish Hatchery. This site is no longer utilized as a Fish Hatchery, but it is owned and managed by the Texas Parks & Wildlife Department and they do maintain water in the abandoned hatchery, also a Resaca. The USFWS will continue to supply water to the State Hatchery Site. The State Resaca also holds about 40 acre feet and their annual usage is also about 75 acre feet.

The District will supply water to the USFWS LRGVNWR Resaca in exchange for water allocation. The Refuge does not have cash to pay for water, nor does it have cash to pay for water distribution improvements. It does, however, have water rights and current allocation in storage in the Lower Rio Grande Valley Watermaster System.



Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 4.2
Solar Powered Pump Plan Detail
Job No.: 408-004 Date: 01/07/2015

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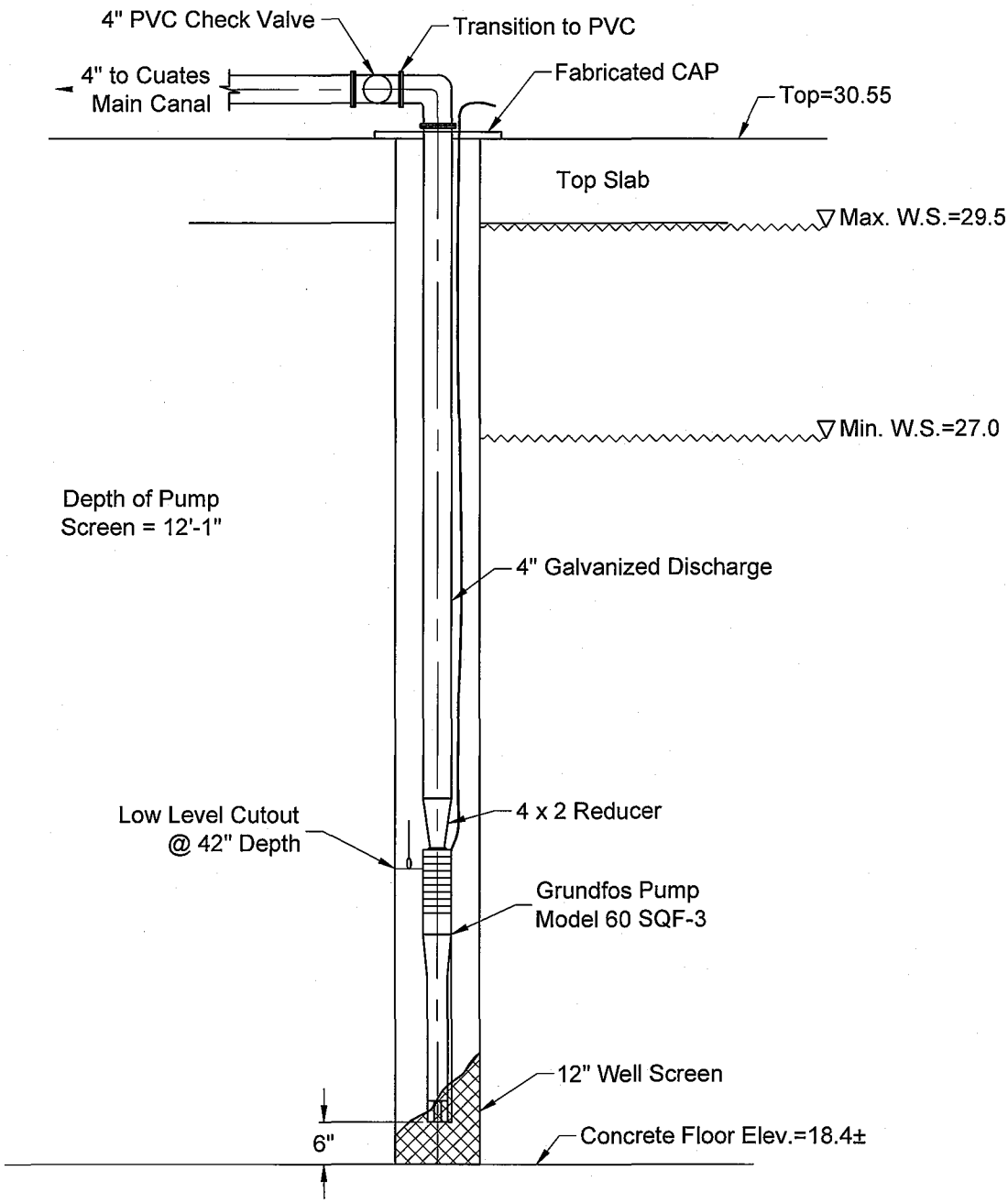

2nd Lift Pump Station Detail

Profile View

Horizontal: 1"=2'
Vertical: 1"=2'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 4.3
Solar Powered Pump Section Detail
Job No.: 408-004 Date: 01/07/2015

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Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 4.4
Photograph of Solar Powered Pump Location
Job No.: 408-004 Date: 01/07/2015

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1000 500 0 1000

750 250

Scale: 1"=1000'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 5.1
USFWS LRGVNWR Hatchery Tract
Job No.: 408-004 Date: 01/07/2015

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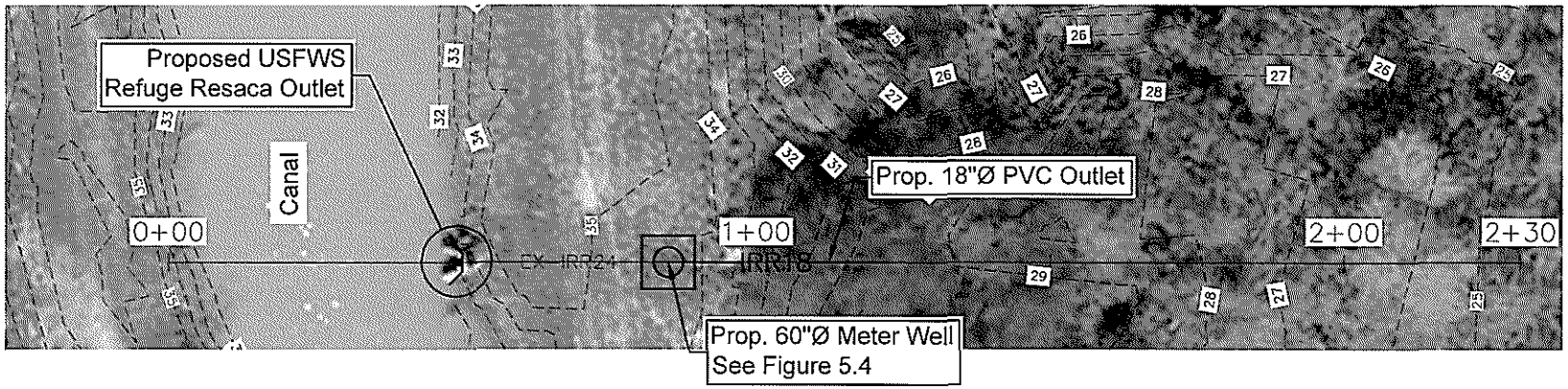
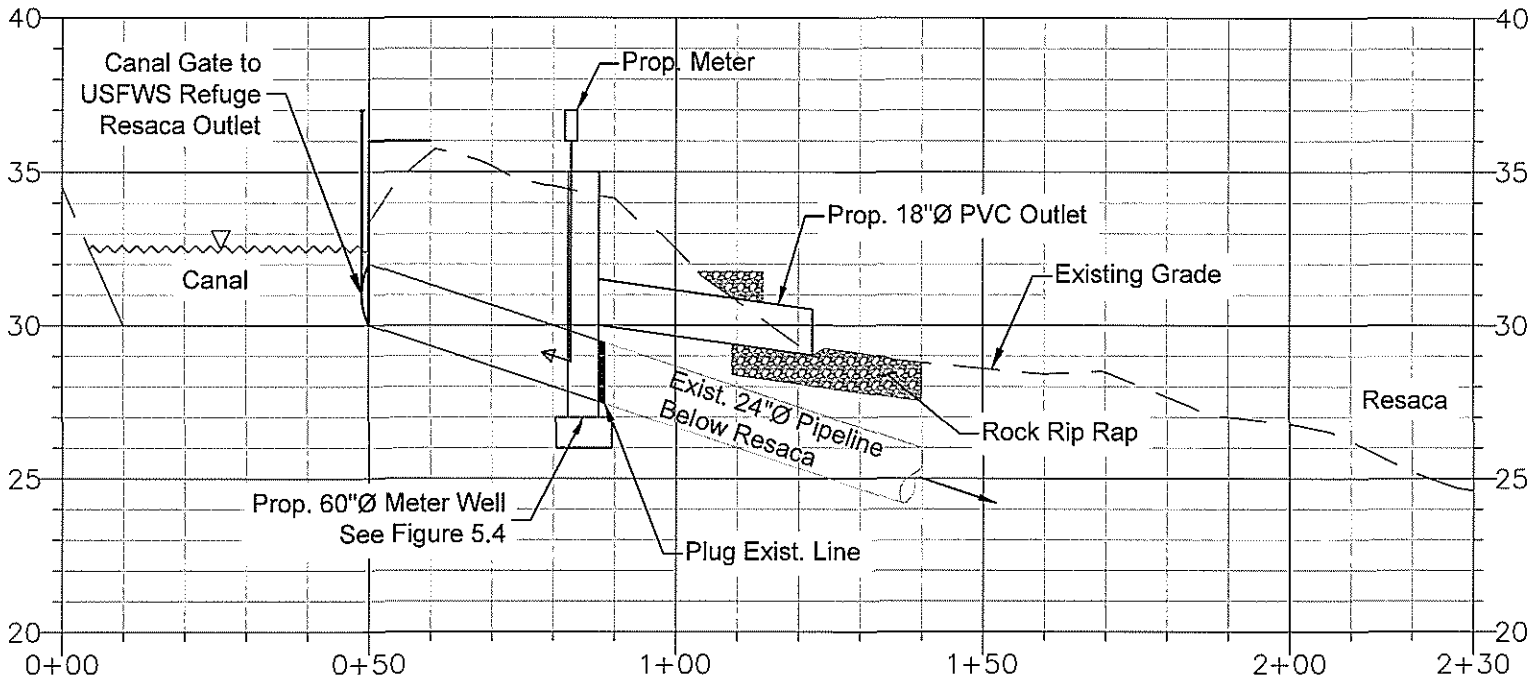


Plan View
Scale:1"=30'



Profile View
Horizontal Scale:1"=30'
Vertical Scale:1"=6'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 5.2
USFWS Resaca Outlet Plan & Profile
Job No.: 408-004 Date: 01/07/2015

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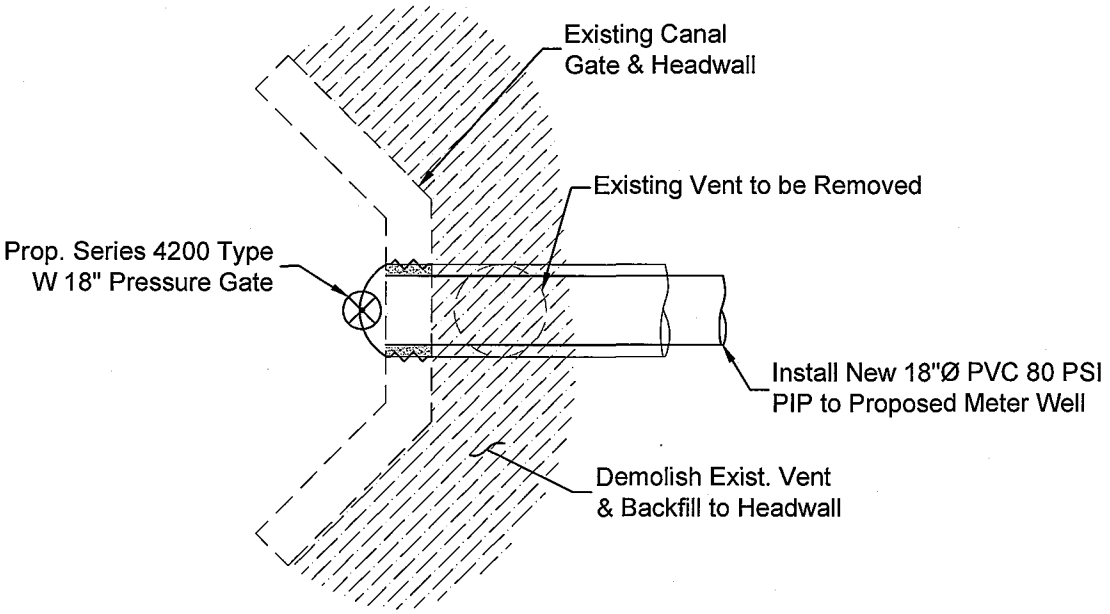
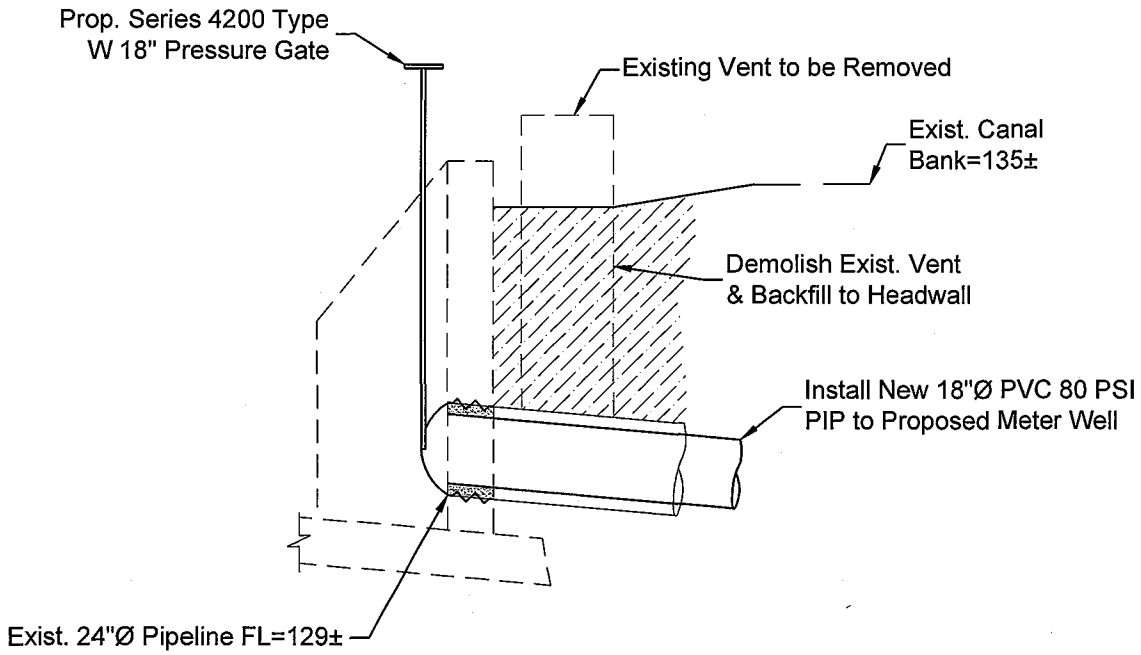


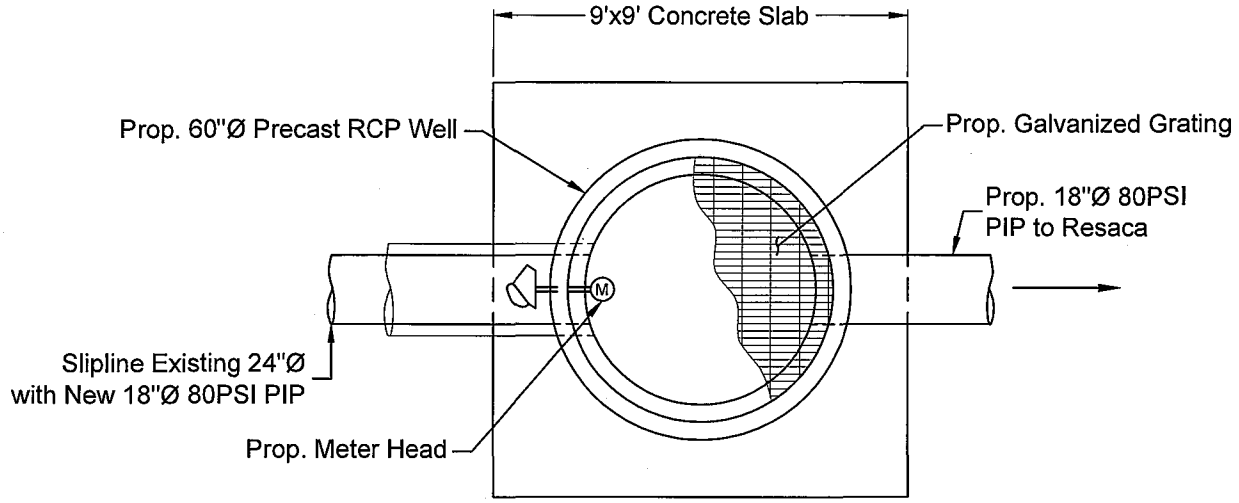
Plan View
Scale: 1"=4'



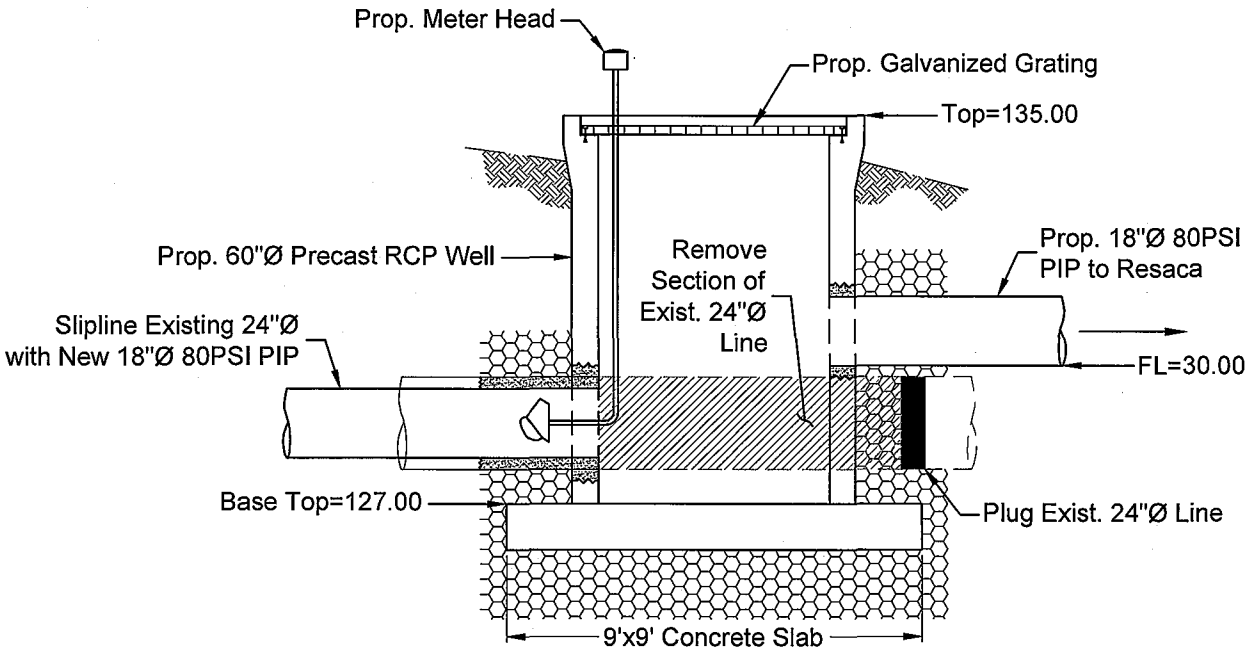
Profile View
Scale: 1"=4'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 5.3
Canal Headwall Plan & Profile
Job No.: 408-004 Date: 01/07/2015

F:\0408 Cameron County Irrig. Dist. #6\408-004 Saldana Canal\2015 Watersmart Grant\DWG\408-004 2015.dwg, Figure 5.3 to 5.5, 1/7/2015 12:06:33 PM, 1:1



Plan View
Scale: 1"=4'



Profile View
Scale: 1"=4'

Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 5.4
Meter Well Plan & Profile
Job No.: 408-004 Date: 01/07/2015

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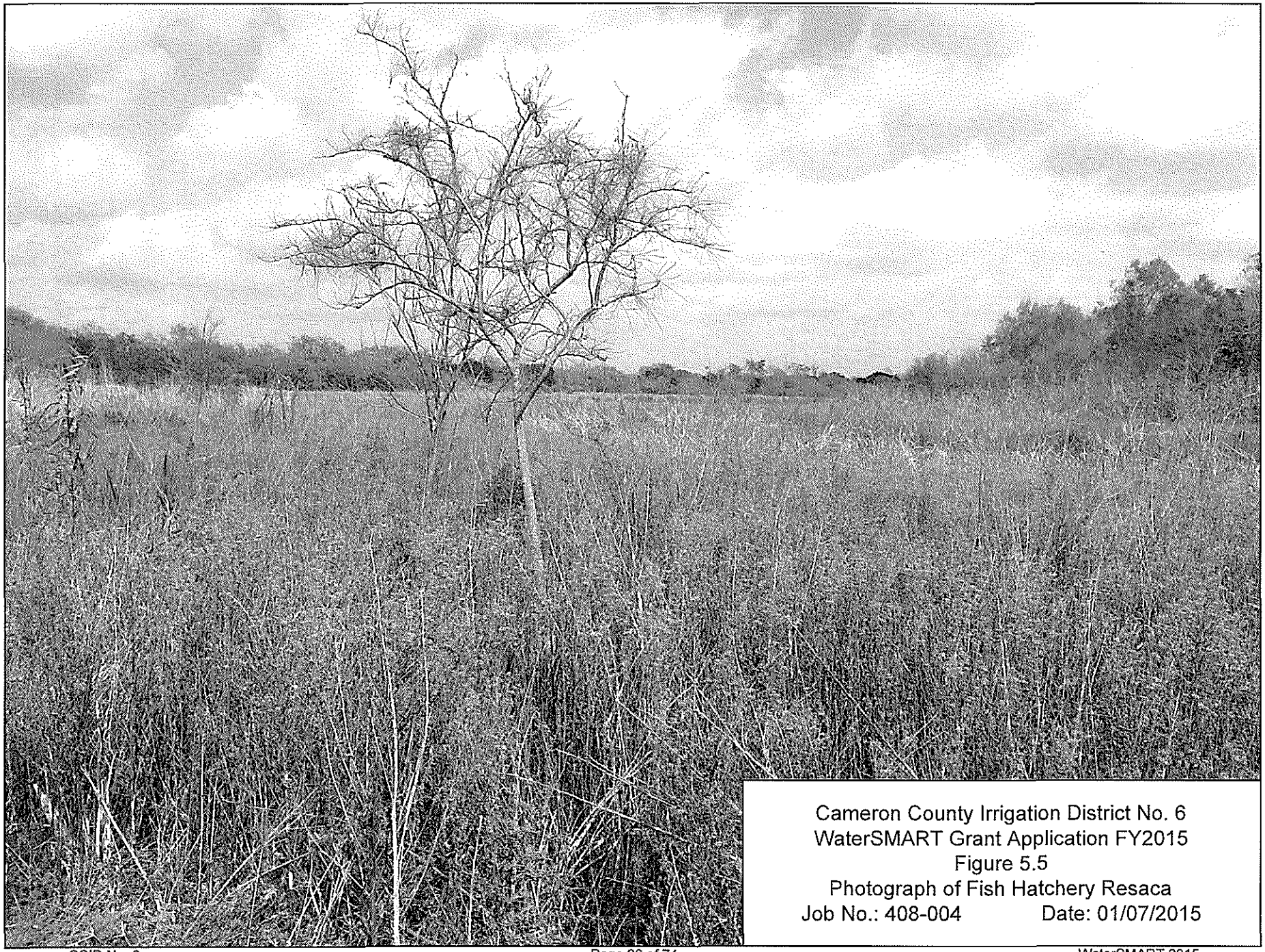


Cameron County Irrigation District No. 6
WaterSMART Grant Application FY2015
Figure 5.5
Photograph of Fish Hatchery Resaca
Job No.: 408-004 Date: 01/07/2015

F:\0408 Cameron County Irrig. Dist. #6\408-004 Saldana Canal\2015 Watersmart Grant\DWG\408-004 2015.dwg, Figure 5.3 to 5.5, 1/7/2015 12:17:22 PM

The USFWS will grant the District 1 acre foot of water allocation for every acre foot of water delivered. The proposed outlet is expected to deliver 150 acre feet of water per year, resulting in a water exchange of 150 acre feet per year of water from the USFWS account to the District's account. In dry years, this will be more.

The District has begun and will complete the process to convert all of its irrigation water rights to mixed use rights which will add mining to the irrigation rights. There has been an increased need for mining water in the region. This will satisfy an existing demand in the region and allow more opportunity for the District to sell allocation.

Water Rights in the lower Rio Grande are well managed by the Texas Commission on Environmental Quality (TCEQ) through the Watermaster Operations. This District actively participates in the Regional Water Market. The District has sold 33,769 acre feet of excess water in the past three (3) years to customers in need. The District has diverted about 17,000 acre feet of No Charge water over the past five (5) years. No Charge water is water that would have otherwise been lost to the Gulf of Mexico. The District will continue to market excess water. The exchange of water from the USFWS will add to the water the District will make available to other users in the system in need.

(4) Technical Proposal: Evaluation Criteria
(A.) Water Conservation.

Subcriterion No. A.1 – Water Conservation:

Subcriterion No. A.1(a) – Quantifiable Water Savings:
The water saved as a result of the Placement of the Saldaña Canal into Pipeline is projected to be 275 Acre Feet per year (see Table 2). Seepage in the main canal was determined by a ponding test that resulted in an average loss of 1.56 acre feet per day. Appendix "A" provides the results of the ponding test. Seepage was measured in the whole Saldaña Canal to be replaced. Table 2 provides a breakdown of how the losses were calculated. In general, the Saldaña Canal service area is about 800 acres. Not all of the area is actively irrigated.

In 2013, the District irrigated a total of 459 acres (Table 3) through the Saldaña Canal. In more active years, and once the pipeline is installed, an average year is expected to result in about 60 days of operation and the canal being filled about 30 times. The resulting annual loss, as outlined in Table 2, is 275 acre feet per year.

Subcriterion No. A.2 – Percentage of Total Supply
Table 4 provides the Quantifiable Water Savings expressed as a percentage of Total Supply. Over the past five years, out of the 35,000 acre feet diverted by the District, 23,700 were for use in the District and can be considered the District's Total Supply. The Annual Water Savings expressed as a percentage of the District's Total Supply is 1.2%. If one considers Water Savings as a percentage of the Saldaña Canal Service Area, and the Saldaña Canal Service Area will operate for 60 days at 10.61 acre feet per day, the annual water savings expressed as a percent of supply is 43.2%. To water the same acreage after the canal is put into pipeline will require about 636 acre feet less 275 acre feet of losses or a net 361 acre feet.

Table 4
Quantifiable Water Savings

Estimated Annual Water Savings (from Table 2)	275	Acre Feet
Average Annual Diversions (From Table 1)	35,041	Acre Feet
Less Customer Diversions (from Table 1)	(11,309)	Acre Feet
Annual District Supply	23,732	Acre Feet
Annual Water Savings expressed as a percent of Total Supply	**1.2%**	
Consider Water Savings as a percent of Saldana Canal Service Area		
Saldana Pump and Canal Irrigation Rate (from Table 3)	10.61	Ac.Ft./day
Average Year Number of Days operating (From Table 2)	60	days
Annual Estimated flow through Saldana Canal	636	Acre Feet
Annual Water Savings expressed as a percent of Total Deliveries through Saldana Canal	**43.2%**	

Evaluation Criterion B: Energy-Water Nexus

The District accomplishes Task "B" in three ways. First and further described in the following section, Subcriterion B.1, is by construction of a Solar Powered Second Lift Pump. In addition, the District will accomplish energy conservation by not pumping conserved water at the First Lift and by elimination of the inefficient Saldaña Pump Station. The latter two are described more thoroughly in Subcriterion B.2. It is the District's hope that any points not awarded under B1 may be offset by point awarded under B2 for a full 16 points.

Subcriterion No. B.1 – Implementing Renewable Energy Projects Related to Water Management and Delivery:
The District will implement a renewable energy project utilizing solar energy to provide a solar powered pump at the existing Second Lift Station. The solar powered pump will lift water from lower Resaca de Los Cuates Storage Reservoir to the Cuates Main Canal. The water is currently lifted by electric powered pump and natural gas powered pumps.

The Solar Powered Pump will pump 50 acre feet per year. Table 5, displays the estimated output of water and solar energy generated and converted to water energy at the Second Lift Pump Station. The information was obtained from Grundfos Pump Company. Pertinent data is included in Appendix "B".

An additional benefit of this Solar Powered Pump is that it will satisfy a demand on the Cuates Main Canal placed by several nurseries that need water for their operations when demand from other District customers in low. The nursery demands cause the District to start its electric Second Lift Pump that has a high kilowatt demand on for an hour or two a month, resulting in a large demand charge. Once the Solar Powered Pump is online and allowed to run daily, the need to run the electric pump for short durations should be significantly reduced.

The Solar Powered Pump does not have any water needs. The environmental benefits are that the solar power will replace some of the pumping energy currently provided by conventional electric power or the natural gas driven pump.

Subcriterion No. B.2 – Increasing Energy Efficiency in Water Management:
The Project will result in energy conservation by not pumping conserved water at the First Lift Pump Station. Table 5 outlines the energy conserved at the First Lift. From the District's "New River Pump Station Engineering Report", the energy conserved at the First Lift per acre foot pumped is 14.46 kilowatt hours per acre foot pumped. By not pumping the conserved 275 acre feet per year at the First Lift, 3,975 kilowatt hours will be conserved per year.

Elimination of the inefficient Saldaña Pumps will result in significant energy savings. The Saldaña Pump, from Table 3, utilizes 84.41 kilowatt hours per acre foot pumped. As displayed in Table 5, in an average year, the Saldaña Pump, pumps 636 acre feet per year consuming approximately 53,700 kilowatt hours. Once this station is eliminated, the water delivered to the new Saldaña Pipeline will flow through the Second Lift Pump Station.

Table 5 provides a calculation of the energy to be conserved out of this pump station. Due to the 275 acre feet of losses that will have been eliminated, the Second Lift will pump 361 acre feet per year. Converting this into electric energy can be performed by assuming a lift of 15 feet and a wire to water efficiency of 60% (typical for a motor 85% efficient and a pump 70% efficient). Energy consumed at the Second Lift Pump Station will be about 9,238 kilowatt hours per year. The Net Energy Conserved by eliminating the Saldaña Pump Station is estimated to b 44,484 kilowatt hours per year.

A summary of Energy Conservation is provided at the bottom of Table 5. The total conventional energy conserved by construction of all three components of the project, placing the Saldaña Canal into Pipeline, Elimination of the Saldaña Pump by constructing the aerial crossing and Construction of the Second Lift Solar Powered Pump is projected to be in excess of 53,000 kilowatt hours per year.

Table 5
Energy Water Nexus

Subcriterion B.1 - Renewable Energy		
Annual Water Production	16,120,000	gallons
	50	Ac. Ft.
Rated Solar Array Power	3.21	Kilowatts
Annual Solar Energy Production	4,593	Kilowatt Hours/year
Average Daily Production	12.58	Kilowatt Hours per Day
Peak Flow Rate	80	gallons per minute
Subcriterion B.2 - Increase in Energy Efficiency		
Energy Conserved at the First Lift		
Conserved Water from piping canal	275	Ac.Ft./year
From the District's "New River Pump Station Engineering Report", the energy consumed at the First Lift per acre foot pumped is	14.46	Kwh/Ac.Ft.
Energy Conserved at First Lift from piping canal	3,975	Kilowatt Hours/year
Energy Conservation from Elimination of the Saldana Pump Station		
Saldana Pump Energy Consumption per Acre Foot	84.41	Kwh/ac.ft.
Estimated Annual Pumpage	636	Ac.Ft./year
Gross annual Consumption at Saldana Pump	53,721	Kilowatt Hours/year
Anticipated Consumption at the Second Lift Pump		
Height of Lift	15	Feet
Net Water that will be pumped at Second Lift	361	Ac.Ft./year
	224	Gals/min
Continuous Water Horsepower required at Second Lift	0.85	Horsepower
Assumed Wire to Water Efficiency	60%	
Continuous Kilowatt Draw required at Second Lift	1.05	Kilowatts
Annual Electric Consumption to Replace Saldana Pump at Second Lift	9,238	Kilowatt Hours/year
Net Energy Conserved by eleiminating Saldana Pump	44,484	Kilowatt Hours/year
Summary of Energy Conservation		
Annual Solar Energy Production	4,593	Kilowatt Hours/year
Energy Conserved at First Lift from piping canal	3,975	Kilowatt Hours/year
Net Energy Conserved by eliminating Saldana Pump	44,484	Kilowatt Hours/year
Total Conventional Energy Conserved	**53,052**	**Kilowatt Hours/year**

Evaluation Criterion C: Benefits to Endangered Species

The proposed project includes providing an outlet for the USFWS to supply water to a Resaca in the Lower Rio Grande Valley National Wildlife Refuge (LRGVNWR). This particular unit, Fish Hatchery, is adjacent to an abandoned Fish Hatchery site owned by the Texas Parks and Wildlife Department. The relationship of the supply to the endangered species is that the refuge is adjacent to the District's Main Canal. Appendix "C" provides information on the refuge system and a link to the Recovery Plan for the Ocelot. Both the "Draft Ocelot Recovery Plan, First Revision," US Fish and Wildlife Service, 2010 and the "Gulf Coast Jaguarundi Recovery Plan, First Revision," US Fish and Wildlife Service identify the LRGVNWR as benefitting the species by adding land to the refuge system and restoring agricultural land to thorn scrub. The Ocelot Recovery Plan identifies the LRGVNWR as one of only three refuge systems that the Ocelot is known to occur. The Refuge manages habitats supporting 19 federally threatened and endangered species including two federally listed endangered cat species, the Ocelot and Jaguarundi. The refuge has water rights, but does not have the infrastructure in place for the delivery of water. Current drought conditions have stressed the habitat of the region and the ability to provide water to the habitat will greatly enhance critical habitat and riparian habitat that is beneficial to the Refuge. The LWRGVNWR and its wildlife corridor goals were initially created to benefit the endangered Ocelot and the Jaguarundi. The USFWS has realized that damming of the Rio Grande has limited flood flow which was once favorable to wetlands and riparian habitat. The USFWS will utilize the outlet to fill a Resaca (oxbow lake) to enhance surrounding habitat. The dense habitat is crucial to the Ocelot, Jaguarundi and their food sources. The construction of this outlet will allow for easier management of the Refuge's aquatic resources, in turn fostering a more diverse and lively environment to support the restoration of the population of these endangered cat species. The provision of water to the refuge will improve the diversity of the environment by providing water to be used at the discretion of refuge management. This component of the project provides the means for the USFWS to better manage their resources which in turn benefits endangered species.

Evaluation Criterion D: Water Marketing

The magnitude and frequency of water supply shortages within the region are severe. Texas Water Development Board's Rio Grande Regional Water Planning Group (Region M) estimates population in the eight county region is expected to grow from 1.7 million in 2010 to 4 million in 2060, the water supply shortage is expected to reach a staggering 592,084 acre ft/yr by 2060, which would result in 35 percent of water demands being unmet.

The District actively participates in the regional water Marketing. The Rio Grande Watermaster Operation serves as a water bank for water right holders within its jurisdiction. Contracts are made between users to transfer water allocation and the Watermaster Office accounts for those contracts. The District has sold 33,769 acre feet in allocation over the past three years to users in need. In addition, the District actively diverts "No Charge" or excess flows in the Rio Grande that would otherwise flow to the Gulf of Mexico. The "No Charge" water is stored in the District's reservoirs and made available to other users in the system by the contract sale of allocation to other users in the Rio Grande Watermaster System.

The District will divert water to the USFWS LRGVNWR in exchange for water allocation and will adopt a policy to make that amount of water available to users out of District once an agreement is made with the Bureau for a period of ten (10) years. The anticipated amount of water to be marketed is an annual average of 150 acre feet per year.

The District is in the process of converting all of its irrigation water rights to mixed use to allow mining use as well. This will allow the District to market excess water for minimum use to help satisfy a need in that area.

Evaluation Criterion E: Other Contributions to Water Supply Sustainability

Subcriterion E.1 – Addressing Adaptation Strategies in a WaterSMART Basin Study
The "Lower Rio Grande Basin Study" was completed in December 2013 by the BOR in cooperation with the Rio Grande Regional Water Authority (RGRWA). The District is a member of the RGRWA. The Basin Study refers to the 2010 Region M Plan, "Rio Grande Regional Water Plan", dated October 1, 2010 to reiterate that Irrigation Conveyance System Conservation as one of the water management strategies that will result in the greatest amount of water for further use when compared to 15 other strategies. This placement of the Saldaña Canal into pipeline is an Irrigation Conveyance System Conservation Project. In addition, the Basin Study states that, "Recent indications show that water use for mining for hydraulic fracturing (fracking) related to oil and gas activities have increased tenfold over current Region M estimates(42,000 ac-ft/year compared to 4,200 ac-ft/yr). By converting its water rights form irrigation to mixed use to allow for mining in addition to irrigation and marketing converted water to out of District mining uses, the District will help satisfy a demand for water that is currently experiencing a shortage.

The Basin Study ultimately chose one water management strategy out of the 15 identified that did not use the Rio Grande as a source and was cost effective; desalination of blackish groundwater (DBG). The District's project conserves Rio Grande water through irrigation conveyance conservation, making conserved water available to others.

Subcriterion E.2 – Expediting Future On-Farm Improvements
The District has not proposed nor identified on-farm improvements. Elimination of the Saldaña Pump and placement of the Saldaña Canal into pipeline will allow for more efficient on farm improvements. The line can remain charged for those that choose to install drip systems rather than having to rely on priming and running the Saldaña Pumps. In addition, more pressure will be available in the closed pipeline system to allow for more efficient on farm systems such as lay flat poly.

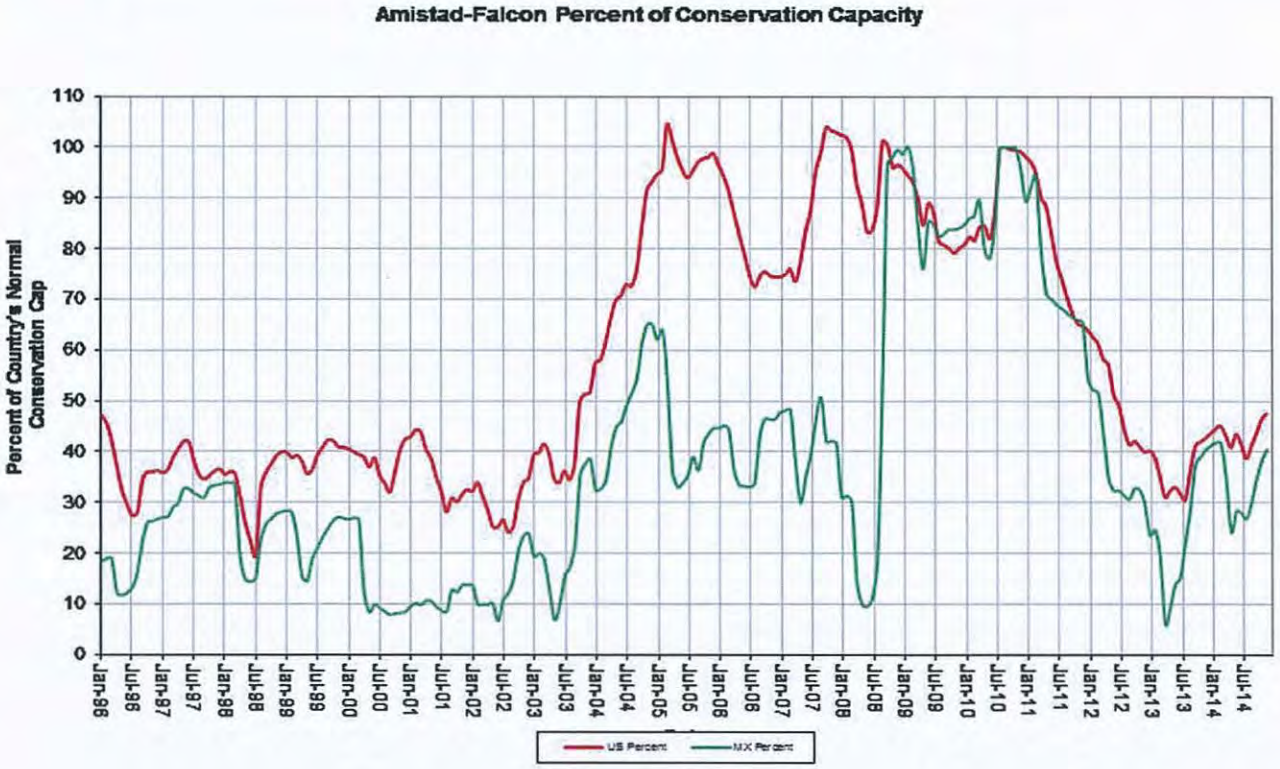
Subcriterion E.3 – Building Drought Resiliency
In recent years, total water demand in the study area has exceeded available supplies. Not only has supply been insufficient, but also inconsistent due to increasingly frequent periods of drought and the failure of Mexico to honor international treaty obligations, that require its contribution of inflows into the Rio Grande (Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico, February 1944). A large portion of the water which flows into the Falcon and Amistad Reservoirs (managed by the International Boundary Water Commission) is contributed by runoff from Mexico.

The 1944 U.S.-Mexico Water Treaty dictates that Mexico contributes 350,000 acre-feet per year to the Falcon and Amistad system. The Treaty, however, allows Mexico up to five (5) years to repay the water debt that can amount up to 1,750,000 acre feet. Compounded by the fact that the Watershed is within a semi-arid environment and the water rights have been over adjudicated, the potential for extended drought is high. The Lower Rio Grande Valley Watermaster System is currently at 47.5% of conservation storage capacity in the third year of a drought that began in 2012. The last time the reservoir storage dropped below 50%, it lasted for nine (9) years and ended in 2004. Figure 6 is a graph of the Amistad-Falcon Storage Conditions from 1996 to present.

A 2009 GAO Study found that "Federal efforts to meet drinking water and wastewater needs in the border region have been ineffective" in part from lack of a comprehensive assessment of needs in the region and a lack of coordinated policies and processes between Federal agencies (United States Government Accountability Office, Rural Water Infrastructure, Report to the Chairman, Committee on Agriculture, House of Representatives, 2009).

In 2010, the net demand for all users exceeded available supplies by 368,356 acre feet, all of which was borne by supply and demand imbalances in the irrigation sector. By 2060, net demand will exceed existing supplies by 592,084 acre feet, this time driven by imbalances for all water user groups, with municipal demand contributing the majority. In 2010, water shortages resulted in 24.8 percent of demand going unmet. According to current projections in the 2011 Region M Plan (http://www.riograndewaterplan.org/water plan.php), by 2060, 35.2 percent of demand will be unmet.

Figure 6



Source – International Boundary & Water Commission

Recently, droughts in 2009 contributed to losses of $19 million for south Texas farmers. Dry land farming was most affected, although irrigated agriculture lost nearly $1.5 million (Santa Ana, R., "Drought losses top $19 million in Lower Rio Grande Valley" AgriLife NEWS, Texas A&M University, November 13, 2009). Other reports have estimated the annual regional impact of agricultural water shortages costs the local economy $135 million and 4,130 jobs (J.R.C. Robinson et al. /Water Policy 12 (2010) 114-128 Mitigating water shortages in a multiple risk environment). The economic impacts of unmet irrigation water demands directly contribute to reduced economic activity in other sectors and the slowing or reversal of job growth in the region. In the long term, an economic slowdown could result in water districts forgoing projects that could increase efficiency and provide adequate service to all users. With the shift to urbanization in the region, while continuing to rely on existing scarce supplies, these impacts can be expected to intensify in the future.

Conservation of water through placement of the Saldaña Canal into pipeline, conversion of the District's irrigation water rights to mixed use and marketing of conserved and excess water by the District help to alleviate shortages in the Lower Rio Grande Basin.

Subcriterion E.4 – Other Water Supply Sustainability Benefits:
All the Lower Rio Grande Valley Water Right holders have a collective interest in water conservation. Water conserved is available for future use or remains in the Rio Grande system to be marketed or distributed to other users. In addition, conserved water results in power conservation. Since the District is a non-profit public entity, power cost savings and conservation efforts will benefit all the end users including the farmers, customers of Olmito Water Supply Corporation, citizens of Los Fresnos, customers of Districts 10 & 11, businesses and all wholesale customers of the municipal suppliers. This project will impact several hundred thousand people and will reduce the demand for the surface water supplies of the Rio Grande. The Rio Grande system is widely considered an over-allocated system.

The project promotes and encourages collaboration among parties by working with the USFWS on the LRGVNWR. The District can easily perform water infrastructure improvements for the refuge system that will help the refuge better manage its water rights and habitat. The refuge system attracts tens of thousands of visitors each year to the local area resulting in an annual boost to the local economy. The District will likely pump water for the refuge for many years to come, resulting in a permanent relationship. It is difficult for the USFWS to obtain the funding to perform the needed capital improvements as they are experiencing federal budget cuts, as a result they are very much in favor of this grant.

The District was awarded a grant from the Texas Water Development Board through its Agricultural Grant Program to place the Saldaña Canal into a pipeline. One of the goals of that program is to provide education and outreach. The following is a description of the proposed Education and Outreach Program developed for that grant. If awarded the Bureau grant, the District will add a renewable energy component to the Education and Outreach Program.

The District will conduct a two day seminar for its Board of Directors, Staff and Producers to report on the water and energy conservation from this project as well as educate participants about the potential to charge irrigators on a metered basis.

The District will utilize the Rio Grande Center for Ag Water Efficiency for classroom space and Harlingen Irrigation District personnel for training of meter alternatives.

The District will also visit an irrigation district in the area that currently has an option to charge on a metered basis. The proposed schedule is as follows:

Day 1 – Morning – Report on water and energy conservation success of the Saldaña Canal conversion to pipeline.
Day 1 – Afternoon – Demonstration by Harlingen Irrigation District on metering.
Day 2 – Morning – Presentation on an irrigation district that currently offers an option for metered water.
Day 2 – Afternoon – Site visit to an irrigation district that has a metering option to review their billing procedures, SCADA system and visit field telemetry.

The seminar should occur around July 2016.

Evaluation Criterion F: Implementation and Results

Subcriterion No. F. 1 – Project Planning:
The District's Water Conservation Plan is included as Appendix "D". The District is completing its more efficient New River Pump Facility which will result in energy conservation. The District has completed preliminary engineering and design to develop this grant application. This preliminary engineering is necessary to deliver an adequate budget proposal as well as water and energy conservation projections. The proposed works will improve sustainable water supplies for the 21st century. The "Region M Regional Water Plan," which includes this District, states the following;

> *"What is clear, though, is that improving Irrigation District systems that convey water from the Rio Grande to both farms and cities is the most economical means of stretching limited water supplies to meet all needs."*

The Lower Rio Grande Valley Watermaster system is unique from other systems in that water saved in the agricultural process remains in the water users' account for agricultural usage in the following year. Furthermore, state law mandates that irrigation rights for land placed into subdivisions must be made available to the potable water retailer where the subdivision is located and those water rights must be available for sale to that entity or other similar entities in the area.

Subcriterion No. F. 2 – Readiness to Proceed:
The preliminary designs are completed and are quite simple and can be finished within 90 days of award. Environmental compliance will be easily achievable because all tasks to be completed will take place in previously disturbed areas. The project schedule is designed to implement the components as quickly as possible. The District can begin construction of the projects within 90 days. The construction schedule will only be limited by irrigation demands. The only permit required is the US Army Corps of Engineers Permit for the aerial crossing. A Nationwide permit is available and the process usually takes about sixty (60) calendar days.

Success and completion of the project can only be hindered by climactic conditions. If the current drought continues, the marketing component will be easily achieved.

The project will be completed according to the following schedule:

Table 6
Project Schedule

Quarter	
07/01/15 – 09/30/15	TWDB Contract Execution & Complete design of Saldaña Pipeline. Execute Contract with BOR.
10/01/15 – 12/31/15	Bid out Pipeline. Complete design of Solar Powered Pump, Purchase Solar Powered Pump. Complete design of Aerial Crossing to eliminate Saldaña Pump. Design Refuge Outlet
01/01/16 – 03/31/16	Complete Saldaña Pipeline. Bid out & Design Aerial Crossing. Complete Solar Powered Pump.
04/01/16 – 06/30/16	Complete Aerial Crossing. Performance testing on new facilities.
07/01/16 – 09/30/16	Complete Final Report. Conduct Seminar.

Subcriterion No. F. 3 – Performance Measures
A new seepage test will be conducted on the new pipelines. They will be tested upon completion to verify there is no measureable leakage. The solar powered pump will be tested to quantify actual water produced which translates into energy saved. The District will compare energy consumption at the Second Lift to document efficiency improvement. A meter is proposed on the Saldaña Canal to document the flow through the canal compared to acreage watered. Finally, the water marketing will be documented once the sales have been completed. A record of how much water was delivered to the USFWS LRGVNWR will be reported.

Subcriterion F.4 – Reasonableness of Cost
Table 7 provides an analysis of the Reasonableness of Cost. Considering a design of life of 50 years, typical for canals and pipelines, the Reasonableness of the total Capital Cost divided by the savings of 275 acre feet per year and 50 years yields a cost of $56/ac.-ft./yr. If the capital cost is reduced by the present value of the annual power cost savings of $10,400 per year, considering a rate return of 2%, reduces the capital cost to $443,000 resulting in reasonableness of cost of $32/ac.-ft./yr.

Table 7
Reasonableness of Cost

Overall Project Cost	$769,231	
Expected Project Life	50	years
Water Conservation	275	Acre Feet
Reasonableness of Cost	**$56**	**/Ac.Ft./year**

Reasonableness of Cost considering Energy Savings.

<u>Anticipated Energy Cost Savings at First Lift</u>		
Annual energy conservation at First Lift	3,975	KWH/Year
Long Term Power Cost at First Lift	$0.08	per KWH
Power Cost Savings at First Lift	$318.01	per year
<u>Anticipated Energy Savings at Saldana Pump</u>		
Annual energy conservation at Saldana	44,484	KWH/Year
Long Term Power Cost at Saldana	$0.21	per KWH
Power Cost Savings at Saldana	$9,499.53	per year
<u>Anticipated Energy Savings at Second Lift with New Solar Pump</u>		
Annual energy conservation from solar Pump	4,593	KWH/Year
Long Term Power Cost at Second Lift	$0.13	per KWH
Power Cost Savings from Solar Pump	$594.95	per year

Total Power cost Savings per Year	$10,412.50	
Present Value of Power Cost Savings assuming 2% @ 50 Years	$327,198.19	
Overall Project Cost reduced by Present Value of Power Cost Savings	$442,032.58	
Expected Project Life	50	years
Water Conservation	275	Acre Feet
Reasonableness of Cost after considering Power Cost Savings	**$32**	**/Ac.Ft./year**

Evaluation Criterion G: Additional Non-Federal Funding

The Texas Water Development Board will fund $150,000 of the project and the District will fund the remainder resulting in total Non-Federal Funding of 61%.

$$\frac{\text{Non-Federal Funding}}{\text{Total Project Cost}} = \frac{\$469,231}{\$769,231} = 61\%$$

Evaluation Criterion H: Connection to Reclamation Project Activities

There are many users in the Lower Rio Grande Valley that have received funding from the US Bureau of Reclamation (BOR) for water conservation projects. All water conserved in the basin affects other users and all users are connected via the common source of water. The BOR is heavily invested in the local Basin.

The Bureau of Reclamation completed its "Lower Rio Grande Basin Study" in December of 2013 in cooperation with Rio Grande Regional Water Authority (RGRWA) and its 53 member entities, and in collaboration with the Texas Region M Planning Group (Region M), Texas Water Development Board, Texas Commission on Environmental Quality (TCEQ), and International Boundary and Water Commission. The Basin Study evaluates the impacts of climate variability and change on water supply imbalances within an eight county region along the U.S./Mexico border in south Texas. The eight county area of RGRWA includes Hidalgo County and the Cameron County Irrigation District No. 6 is a member of the RGRWA

(5) Environmental Compliance

a) The project will briefly result in dust from the pipeline construction. The impact will be reduced by sprinkling the work areas to minimize dust.
b) The LRGVNWR Resaca Outlet will have a positive impact on the Lower Rio Grande Valley National Wildlife Refuge. The Refuge manages habitat supporting 19 federally threatened and endangered species and 57 state protected species. The Refuge provides habitat for two federally listed endangered species. The Ocelot and Jaguarundi. (See Appendix "C"). This work will be subject to approval and coordination with refuge personnel.
c) The aerial crossing of the Resaca de Los Cuates will require a Nationwide Wetland Permit. The District will comply with the National Permit Conditions. Impact on the Resaca should be minimal and limited to the construction period.
d) Most of the District's facilities were constructed in the 1950s.
e) There will be no modification to existing features.
f) There are no Historical Markers affected by this project.
g) There are no known archeological sites in the project area.
h) The project will not have a disproportionally high and adverse impact on low or minority populations. On the contrary, the project will have a positive impact on low income and minority population by reducing cost of service to municipal water suppliers and their customers. It will also increase the overall water supply to an area with a low income and minority population.
i) There are no tribal lands in the project area.
j) The project will not contribute to the continued existence or spread of noxious weeds or non-native invasive species.

(6) Required Permits or Approvals

A concurrence from the US Army Corps of Engineer, Corpus Christi Field Office, that a Nationwide Permit may be utilized for the aerial crossing is required. Such a concurrence takes about sixty (60) days. The Refuge Outlet will be coordinated with the USFWS.

(7) Official Resolution

The District adopted an Official Resolution at their meeting on January 8, 2015. A copy of the Resolution is included as Appendix "E". The Resolution authorizes the General Manager to apply for the Grant.

(8) Project Budget

A. Funding Plan and Letter of Commitment

The District was awarded an Agricultural Conservation Grant from the Texas Water Development Board in the amount of $150,000 to place the Saldaña Canal into Pipeline. We are requesting $300,000 from the Bureau of Reclamation, leaving a balance of $319,231, to be funded by the District. A letter from the Texas Water Development Board indicating award of the grant is included as Appendix "F". The District has its share of the project cost ($319,231) in cash, as evidenced by the excerpt from their audit, included as Appendix "G". Table 8, Funding Plan, indicates the funding plan by source and the percentage from each source.

Table 8
Funding Plan

Funding Source	Total Funding Amount	% of Total
Non-Federal entities		
Texas Water Development Board	150,000	19.50%
District (Applicant)	319,231	41.50%
Non-Federal Subtotal:	**469,231**	**61.00%**
Other Federal entities		
None	-	-
Other Federal Subtotal:	-	-
Requested Reclamation Funding:	300,000	39.00%
Total Project Funding:	**769,231**	**100.00%**

B. Budget Proposal & Narrative

Table 9 provides a Budget for the project. A Budget Narrative for each item and how it was developed is included in this section. In addition, supporting cost information is provided in Appendix "H". Table 9 provides a line item number for each item in the budget that is described in this narrative with the reference number noted in Appendix "H" where useful.

The District personnel involved in this project along with their salaries and fringe costs are detailed in Table 9.1. The General Manager, Mr. Tito Nieto, has been District Manager for three years. Prior to working at District 6 he worked for United Irrigation District for thirteen years and managed their BOR Lower Rio Grande Valley Conservation Project. United Irrigation District had completed a good portion of their LRGV Project while Mr. Nieto was Manager. Mr. Nieto brings his is experience in construction and the BOR process to District 6. The Office Manager is Mrs. Patricia Muñoz. Mrs. Muñoz also serves as the District's bookkeeper and is responsible for accounting for all the District's labor and equipment time and expenses. The District also plans to utilize two operators and two laborers to complete the portions of the work they will construct with District forces. The fringe costs, as outlined in Table 9.1, include Social Security at 6.2%, Retirement at 7%, Health Insurance at $386.54 per person, per month, Medicare at 1.45%, Unemployment at 0.3% and Workers Compensation at 5.8%. The Life Insurance benefit is different for each person and is detailed in Table 9.1. Paid leave is calculated on the basis of four weeks leave per year. The total Fringe Benefit for each person is provided and utilized throughout Table 9.0.

The Equipment the District plans to use for this project is detailed in Table 9.2. Equipment rates are based on the "Construction Equipment Ownership and Operating Expenses Schedule, Region VI" by the US Army Corps of Engineers, November 2011. Table 9.2 provides the description of each piece of equipment, the District Asset Number, the US Army Corps of Engineers (COE) ID Number and the COE Equipment Description. The Operation Conditions and the Operating and Standby rates are provided in the Table 9.2 and used through Table 9.0, in the budget. The Manager's vehicle is calculated on the basis of the federal vehicle mileage rate of $0.575 per mile.

The First component of the project is placement of the Saldaña Canal into pipeline. The project budget includes fourteen (14) 40 hour weeks to construct, using District forces. The pipeline is 3,800 feet long, the District can lay about 300 feet per week, resulting in 2 ½ weeks; allowing for a few conflicts, three weeks are estimated to lay the pipeline. Assuming four standpipes at one week each and four saddle outlets at one week each, one week to install the gate at the beginning of the project and the meter at the end of the aerial crossing and finally two weeks to remove the canal, results in a total project duration of fourteen (14) weeks at 40 hours per week or 560 hours.

The construction crew time (1.03-1.06) is budgeted at the full 560 hours. The General Manager's (Tito Nieto) time (1.01) is budgeted at about half the crew time to manage the construction operation. The Office Manager's (Patricia Muñoz) time is budgeted at 25% of the crew time to document time and expenses and coordinate orders and deliveries. District Fringe Costs (1.11-1.16) are directly taken from Table 9.1 and are based on the time provided for in 1.01 – 1.06. The Manager's truck mileage is estimated at 10 miles per week (1.21).

The Operator and Crew truck time (1.22 and 1.23) was estimated at 20% of the construction time for travel to and from the project site as well as to deliver materials and supplies. The standby time for the trucks is the balance of time to equal a 40 hour week (1.22s and 1.23s). The excavator and backhoe (1.24 and 1.25) are expected to be operating about 50% of the time and be on standby the other 50% of the time (1.24s and 1.25s). The dump truck (1.26) should be operated about 25% of the time to haul off excess canal materials and relocate better materials for bedding. The standby for the dump truck is item 1.26s. The dozer (1.27) is expected to aid in construction 20% of the time and be on standby (1.27s) for 80% of the time. The trailer (1.28) will be operated 20% of the time to deliver materials from the District yard to the job site. Trailer standby is presented in item 1.28s. The 24" Headwall Meter (1.31) price is quoted and supported by information in Appendix "H". The 24" pipe material (1.32) is based on a truckload quotation form Diamond Plastics (copy in Appendix "H") of $15,480.96 per truckload. Some additional pipe to round out a sixth truck load will be needed as some pipe lengths may break. A quotation from Fresno Valve and Casting, Inc. is included in Appendix "H" for items 1.32-1.36. Item 1.37 is for reinforced concrete (concrete and rebar) to be used in the irrigation wells that will hold the gate valves. The current market price of concrete is about $100.00 per cubic yard. Doubling the value covers the cost of reinforcing steel to be included in the concrete. Item 1.38 utilizes the same unit price amount as the estimated amount to construct all of the gate wells and outlets. Item 1.39 is for 30" reinforced concrete pipe (RCP) needed for the saddle outlets. A list price for pipe material form CAPA, the local pipe supplier, is included in Appendix "H". The price is rounded up to $40.00 as the quantity is less than a truckload. The price for 15" PVC psi pipe (1.40) is included in Appendix "H" as is the price for 15" PVC Bends (1.41). Item 1.42 is for miscellaneous construction materials that will be required to complete the project and are too numerous to quantify; however, the estimate of $1,500 is based on experience with similar projects.

Ferris, Flinn & Medina, LLC will provide surveying and engineering services to construct the project. Services include surveying the canal right of way for boundary and topography. Preparing a set of construction plans to design line and grade, construction staking for the proposed pipeline and assistance throughout construction with developing quotations and specifications for soliciting proposals for materials and supplies. Item 1.51-1.56 reflects the amount of time that will be required to provide the engineering and surveying support. Item 1.61 is for geotechnical materials testing of concrete materials and back fill as required. A budget of 2% of construction is appropriate. The total estimated cost for this portion of the project is approximately $300,000.

The second item to be constructed is the aerial crossing to eliminate the Saldaña Pump. The District will contract with an outside construction contractor to perform this work. The Manager will be involved in the project coordination. The duration of the project is expected to be about six weeks and a budget of 10 hours per week should address Mr. Nieto's time (2.01). The Office Manager (2.02) is expected to spend approximately 30 hours on this part of the project. Fringe benefits are itemized in 2.11 and 2.12.

The Manager's truck is budgeted in 2.21 and is based on mileage of 10 miles per week. Items 2.31 and 2.32 are for construction of the aerial crossing and driveway repair. Driveway repair is quite common; the current market price for such work is reflected in item 2.32. The repair is expected to be 50 feet long to cover an anticipated elevation change. The 24" steel crossing (item 2.31) is quite difficult to estimate due to its uniqueness. The crossing will consist of 24" diameter steel pipeline on 16" square concrete piles. The piles will be driven by a crane with a very long reach. A detailed estimate is provided in Appendix "H". The Contractor will need to place temporary fill in the Resaca so the crane can reach the entire work. The material costs are $71 per foot for the steel pipe and $33.84 per foot of pile. A boat or work barge will be needed to construct the support cradles on top of the 16" concrete piles. A price of $700 per linear foot was settled upon as a budget that would cover the cost. Labor and equipment costs were developed from a respectable Contractor, as detailed in Appendix "H". The Texas Water Code requires that the District develop plans and specifications for a project of this size and competitively bid the work. Items 2.41 through 2.46 are for engineering and surveying services to develop a set of plans and specifications for public bidding. Ferris, Flinn & Medina, LLC (FFM) will also provide services to solicit and advise the District on the bids. FFM will provide construction phase contract administration and construction staking. Item 2.51 is for the geotechnical boring to aid in design of the piles and help the Contractors with bidding decisions. Also included is testing services to verify contract compliance through concrete testing. A budget of 5% of construction is appropriate. The total cost of the aerial crossing is approximately $306,000.

The third component of the project is the Solar Powered Second Lift Pump Station. The District will install the pump and discharge line but will need an electrical contractor to install the electrical components, a roofing contractor to install the panels and the pump house roof and a road boring contractor to install an 8" casing across Farm to Market Road 803 (State Road). For the District's share of the work, 40 hours of crew time is budgeted (3.03-3.06) while the Manager will spend half as much time (3.01) and the Office Manager will spend about 10 hours (3.02) accounting for the work. Fringe benefits are itemized in 3.11-3.16. The Manager is expected to drive 10 miles a week to accomplish this work (3.21), while the operator and crew truck operating time will be 8 hours each (3.22-3.23). The standby time is provided in times (3.22s & 3.23s). The only other equipment needed is the backhoe that is expected to operate about 20 of the 40 hour week, detailed in items 3.24 and 3.24s. The materials for this portion of the project include the solar pump package itemized in Appendix "H", in the amount of $22,417.50 (3.31). It is anticipated that the District will purchase supplies for the installation of the electrical, including conduit and a rack to mount the panel. Based on experience, a $2,500 budget, reflected in item 3.32, is appropriate. A quotation from Aguaworks Pipe & Supply, included in Appendix "H", substantiates items 3.33 and 3.34. Item 3.35 is for structural steel to support a frame to mount the well screen to the pump station. It will be designed during the design stage of the project. A budget of $1,500 seems appropriate. The District will assemble and install the support steel. Item 3.36 is for a 12" diameter well screen. The screen serves as a screen to keep surface water contaminants out of the small diameter well pump. An online cost resource was utilized to determine that the cost of the stainless screen is $255.00 per foot for 15 feet. Item 3.37 is for miscellaneous materials and supplies that will inevitably be required to accomplish this project.

The District envisions hiring a roofing contractor to install the solar panels to insure integrity of the roof. A typical cost to install the solar panels while repairing and reinforcing the roof is $25.00 per square foot for 300 square feet (3.41). The actual work to be performed will be determined during the design phase. An electrical contractor will be required to connect the solar panels to the control panel and wire the pump. A budget (3.42) of 40 hours at $90.00 per hour for an electrical contractor is included. Finally, a road boring contractor will be utilized to furnish and install 60 linear feet of casing under State Farm to Market Road 803 by dry bore as required by TxDOT. Based on experience with bores of this size and length, the estimated cost will be $250.00 per foot for 60 feet as detailed in item 3.43.

FFM will provide surveying and engineering services to develop details for the pump screen, roof solar panel installation details, piping plan and profile and application for TxDOT permit. FFM will assist the District with contractors and installation of the systems as required. Items 3.51 through 3.57 detail the level of effort that will be required to complete engineering and surveying work. Item 3.61 is the estimated cost to provide a geotechnical bore at site of the road bore to determine road conditions for the boring contractor. The total cost for the Second Lift Solar Powered Pump is nearly $92,000.

The District will construct the Refuge Outlet with District forces. The work includes installation of a new canal gate in the existing headwall, sliplining the existing 24" line with a new 18" PVC pipeline, construction of a metering well and laying 18" pipeline to the Resaca. Items 4.01 through 4.06 include the level of effort for one week's crew time. The fringe benefits are itemized in items 4.11 through 4.16. This site is much further than the District office; therefore, the Manager's mileage (4.21) is budgeted at 30 miles per day for 5 days. The operator and crew trucks are expected to operate 12 hours per week (4.22 and 4.23) and standby time is itemized in 4.22s and 4.23s. The excavator (4.24) and backhoe (4.25) are expected to be required 20 hours with equal standby time (4.24s and 4.25s). The dozer (4.26) is expected to operate 10 hours with 30 hours of standby time (4.26s). The trailer (4.27) operating and standby time (4.27s) will equal the crew truck time.

A quotation for the 18" headwall meter is provided in Appendix "H" (4.31). A quotation for the 18" pipe is also included in the Appendix for item 4.32. A price from Fresno Valve and Casting is utilized for item 4.33. Item 4.34, 60" diameter RCP is based on the CAPA price list included in Appendix "H" rounded up to $125.00 per foot. Item 4.35 is the price for concrete and reinforcing for the anticipated meter well foundation quantity of 4.5 cubic yards. The budgeted amount for miscellaneous supplies and materials is $1,000.00 per item 4.36.

FFM will provide all of the required surveying and engineering for this item. The level of effort by FFM is itemized in budget items No. 4.51 through 4.56. The survey crew will provide a topographic survey and provide construction staking for the planned facilities location. The total cost of the Resaca outlet is estimated to be about $29,000.00.

The anticipated reporting for the project is estimated in item 5.01 through 5.23. This includes testing of the pipeline and evaluation of metered flow to verify and document the water savings. The reporting will also cover reporting requirements by the Texas Water Development Board (TWDB). FFM will assist the District as needed with the reporting.

An education and outreach component was developed for the TWDB. Items 6.01-6.12 are the District's labor and fringe cost to accomplish the seminar proposed for the TWDB grant objectives. The Manager is expected to drive 200 miles (6.21) to accomplish this task at various sites. FFM will assist with development and presentation at the seminar. FFM level of effort is expected as itemized in 6.31 and 6.33. The Harlingen Irrigation District (HID) Rio Grande Center for Water Efficiency will be utilized along with its Instructor, Mr. Tom McLemore; item 6.43 is the quoted rate for 12 hours use of the facilities.

Item 7 is an estimate of 1.67% inflation bringing the total project cost to $769,231. There will inevitably be some inflation between preparation of this application and the construction of the project.

Item 8 is for Environmental & Regulatory Compliance Cost. The District has included in its budget 2% of the total project cost, itemized in items 1-6. The amount budgeted for Environmental and Regulatory Compliance is in excess of $14,800. The major item for Regulatory Compliance is a possible US Army Corps of Engineers permit for the aerial crossing. The amount of work required is difficult to predict and will be determined by the USACE office in Corpus Christi, Texas. The Texas Historical Commission will be consulted. Development of the submittal data is included in the 2%.

C. Contractual Procurement

Cameron County Irrigation District No. 6 is a public entity operating under the Texas Water Code and subject to those procurement standards. Construction proposals and materials over $25,000 will require quotations from three different suppliers and/or contractors. Materials and construction contracts over $75,000 will require utilization of the public bid process including advertisement in a newspaper of general circulation twice at least 3 weeks prior to the bid date. The fact that the District follows the Texas Water Code should give the BOR confidence that the District is obtaining the best prices possible.

D. Indirect Costs

There are no indirect costs proposed for this project.

E. Budget Form

Budget Form SF424C follows.

Table 9
Budget

Item	Description	Qty	Units	Unit Price	Total Price
1. Placement of the Saldana Canal into Pipeline					
District Salary and Wages					
1.01	General Manager	280	hours	$26.27	$7,354.30
1.02	Office Manager	140	hours	$14.66	$2,052.12
1.03	Operator 1	560	hours	$11.55	$6,468.00
1.04	Operator 2	560	hours	$8.93	$4,998.00
1.05	Laborer 1	560	hours	$9.19	$5,145.00
1.06	Laborer 2	560	hours	$8.16	$4,568.76
District Fringe Benefit Cost					
1.11	General Manager	280	hours	$10.60	$2,968.56
1.12	Office Manager	140	hours	$6.98	$976.93
1.13	Operator 1	560	hours	$6.25	$3,497.70
1.14	Operator 2	560	hours	$5.32	$2,978.40
1.15	Laborer 1	560	hours	$5.40	$3,023.70
1.16	Laborer 2	560	hours	$5.02	$2,809.17
District Equipment					
1.21	Manager's Truck	140	miles	$0.575	$80.50
1.22	Operator's Truck	112	hours	$12.57	$1,407.84
1.22s	Operator's Truck Standby	448	hours	$1.15	$515.20
1.23	Crew Truck	112	hours	$16.97	$1,900.64
1.23s	Crew Truck Standby	448	hours	$0.95	$425.60
1.24	JD 200 LC Excavator	280	hours	$39.93	$11,180.40
1.24s	JD 200 LC Excavator Standby	280	hours	$8.64	$2,419.20
1.25	Case 590 K Backhoe	280	hours	$31.24	$8,747.20
1.25s	Case 590 K Backhoe Standby	280	hours	$5.33	$1,492.40
1.26	Dump Truck	140	hours	$51.67	$7,233.80
1.26s	Dump Truck Standby	420	hours	$5.20	$2,184.00
1.27	JD 550 Dozer	140	hours	$34.48	$4,827.20
1.27s	JD 550 Dozer Standby	420	hours	$5.42	$2,276.40
1.28	Trailer	112	hours	$5.38	$602.56
1.28s	Trailer Standby	448	hours	$1.58	$707.84
Supplies/Materials					
1.31	24" Headwall Meter	1	Ea.	$2,950.00	$2,950.00
1.32	24" PVC 80 PSI PIP Pipe Materials	6	Truckloads	$15,480.96	$92,885.76
1.33	24" Fresno 4200 Pressure Gates with Stainless Rails and Hardware	2	Ea.	$5,192.00	$10,384.00
1.34	18" Fresno 4200 Pressure Gates with Stainless Rails and Hardware	6	Ea.	$3,133.00	$18,798.00
1.35	16" Fresno 4200 Pressure Gates with Stainless Rails and Hardware	6	Ea.	$2,821.00	$16,926.00
1.36	14"x15" Alfalfa Valves	5	Ea.	$265.00	$1,325.00
1.37	Reinforced Concrete for Wells	46	C.Y	$200.00	$9,200.00

Item	Description	Qty	Units	Unit Price	Total Price
1.38	Reinforced Concrete for Saddle Outlets and Collars	32	C.Y	$200.00	$6,400.00
1.39	30" RCP for Saddle Outlets	32	LF	$40.00	$1,280.00
1.40	15" PVC Pipe for Outlets	100	LF	$7.90	$790.00
1.41	15" PVC Bends	5	Ea.	$259.00	$1,295.00
1.42	Miscellaneous Construction Material including Grout, Stainless Mounting Bolts, etc.	1	Lot	$1,500.00	$1,500.00
Contractual/Construction					
Engineering and Surveying Services to Replace Saldana Canal by Ferris, Flinn & Medina, LLC					
1.51	Registered Engineer	136	hours	$140.00	$19,040.00
1.52	Sr. Cad Technician	136	hours	$75.00	$10,200.00
1.53	Administrative Assistant	36	hours	$55.00	$1,980.00
1.54	Registered Surveyor	20	hours	$110.00	$2,200.00
1.55	Sr. Party Chief	40	hours	$70.00	$2,800.00
1.56	Instrument Man	40	hours	$40.00	$1,600.00
Independent Geotechnical Contractor					
1.61	Geotechnical Testing @	2.00%	of	$256,575.18	$5,131.50
	Subtotal Placement of the Saldana Canal into Pipeline				**$299,526.68**
2. Elimination of the Saldana Pump by Construction of Aerial Crossing					
District Salary and Wages					
2.01	General Manager	60	hours	$26.27	$1,575.92
2.02	Office Manager	30	hours	$14.66	$439.74
District Fringe Benefit Cost					
2.11	General Manager	60	hours	$10.60	$636.12
2.12	Office Manager	30	hours	$6.98	$209.34
District Equipment					
2.21	Manager's Truck	60	miles	$0.575	$34.50
Contractual/Construction					
Construction Contractor to Construct Aerial Crossing					
2.31	Aerial Crossing including coated 24" steel casing and concrete piers	350	Feet	$700.00	$245,000.00
2.32	Driveway Pavement Repair	90	Sq. Yd.	$55.00	$4,950.00
Engineering and Surveying Services to Construct Aerial Crossing by Ferris, Flinn & Medina, LLC					
2.41	Registered Engineer	140	hours	$140.00	$19,600.00
2.42	Sr. Cad Technician	120	hours	$75.00	$9,000.00
2.43	Administrative Assistant	35	hours	$55.00	$1,925.00
2.44	Registered Surveyor	30	hours	$110.00	$3,300.00
2.45	Sr. Party Chief	60	hours	$70.00	$4,200.00
2.46	Instrument Man	60	hours	$40.00	$2,400.00

Item	Description	Qty	Units	Unit Price	Total Price
Independent Geotechnical Contractor					
2.51	Geotechnical Investigation and Testing @	5.00%	of	$252,845.62	$12,642.28
	Subtotal Elimination of the Saldana Pump by construction of the Aerial Crossing				**$305,912.91**
3. Construction of the Solar Powered Second Lift Pump					
District Salary and Wages					
3.01	General Manager	20	hours	$26.27	$525.31
3.02	Office Manager	10	hours	$14.66	$146.58
3.03	Operator 1	40	hours	$11.55	$462.00
3.04	Operator 2	40	hours	$8.93	$357.00
3.05	Laborer 1	40	hours	$9.19	$367.50
3.06	Laborer 2	40	hours	$8.16	$326.34
District Fringe Benefit Cost					
3.11	General Manager	20	hours	$10.60	$212.04
3.12	Office Manager	10	hours	$6.98	$69.78
3.13	Operator 1	40	hours	$6.25	$249.84
3.14	Operator 2	40	hours	$5.32	$212.74
3.15	Laborer 1	40	hours	$5.40	$215.98
3.16	Laborer 2	40	hours	$5.02	$200.66
District Equipment					
3.21	Manager's Truck	10	miles	$0.575	$5.75
3.22	Operator's Truck	8	hours	$12.57	$100.56
3.22s	Operator's Truck Standby	32	hours	$1.15	$36.80
3.23	Crew Truck	8	hours	$16.97	$135.76
3.23s	Crew Truck Standby	32	hours	$0.95	$30.40
3.24	Case 590 K Backhoe	20	hours	$31.24	$624.80
3.24s	Case 590 K Backhoe Standby	20	hours	$5.33	$106.60
Supplies/Materials					
3.31	Solar Powered Pump per Quote	1	Package	$22,417.50	$22,417.50
3.32	Electrical Supplies for Contractor	1	Package	$2,500.00	$2,500.00
3.33	4" PVC Pipe Schedule 80 Pipe	200	Feet	$3.44	$688.00
3.34	4" PVC Fittings and Valves	1	Lot	$775.30	$775.30
3.35	Miscellaneous Steel Support System	1	Lot	$1,500.00	$1,500.00
3.36	12" Stainless Steel Screen	15	Feet	$255.00	$3,825.00
3.37	Miscellaneous Construction Material including Grout, Stainless Mounting Bolts, etc.	1	Lot	$1,500.00	$1,500.00

Item	Description	Qty	Units	Unit Price	Total Price
Contractual/Construction					
Independent contractor to Reinforce Roof and Install Solar Panels, Electrical Contractor to wire electrical components and road boring contractor to install casing across FM 803.					
3.41	Solar Panel Installation and Roof Reinforcement	300	S.F.	$25.00	$7,500.00
3.42	Electrical Contractor	40	hours	$90.00	$3,600.00
3.43	Road Boring Contractor	60	LF	$250.00	$15,000.00
Engineering and Surveying Services to Replace Saldana Canal by Ferris, Flinn & Medina, LLC					
3.51	Registered Engineer	60	hours	$140.00	$8,400.00
3.52	Sr. Cad Technician	60	hours	$75.00	$4,500.00
3.53	Administrative Assistant	30	hours	$55.00	$1,650.00
3.54	Registered Surveyor	20	hours	$110.00	$2,200.00
3.55	Sr. Party Chief	30	hours	$70.00	$2,100.00
3.56	Instrument Man	30	hours	$40.00	$1,200.00
3.57	Structural Engineer	40	hours	$125.00	$5,000.00
Independent Geotechnical Contractor					
3.61	Geotechnical Testing @	5.00%	of	$63,692.23	$3,184.61
	Subtotal Solar Powered Second Lift Pump				**$91,926.84**
4. Refuge Outlet					
District Salary and Wages					
4.01	General Manager	20	hours	$26.27	$525.31
4.02	Office Manager	10	hours	$14.66	$146.58
4.03	Operator 1	40	hours	$11.55	$462.00
4.04	Operator 2	40	hours	$8.93	$357.00
4.05	Laborer 1	40	hours	$9.19	$367.50
4.06	Laborer 2	40	hours	$8.16	$326.34
District Fringe Benefit Cost					
4.11	General Manager	20	hours	$10.60	$212.04
4.12	Office Manager	10	hours	$6.98	$69.78
4.13	Operator 1	40	hours	$6.25	$249.84
4.14	Operator 2	40	hours	$5.32	$212.74
4.15	Laborer 1	40	hours	$5.40	$215.98
4.16	Laborer 2	40	hours	$5.02	$200.66
District Equipment					
4.21	Manager's Truck	150	miles	$0.575	$86.25
4.22	Operator's Truck	12	hours	$12.57	$150.84
4.22s	Operator's Truck Standby	28	hours	$1.15	$32.20
4.23	Crew Truck	12	hours	$16.97	$203.64
4.23s	Crew Truck Standby	28	hours	$0.95	$26.60
4.24	JD 200 LC Excavator	20	hours	$39.93	$798.60
4.24s	JD 200 LC Excavator Standby	20	hours	$8.64	$172.80

Item	Description	Qty	Units	Unit Price	Total Price
4.25	Case 590 K Backhoe	20	hours	$31.24	$624.80
4.25s	Case 590 K Backhoe Standby	20	hours	$5.33	$106.60
4.26	JD 550 Dozer	10	hours	$34.48	$344.80
4.26s	JD 550 Dozer Standby	30	hours	$5.42	$162.60
4.27	Trailer	12	hours	$5.38	$64.56
4.27s	Trailer Standby	28	hours	$1.58	$44.24
4.28	Welder	12	hours	$3.43	$41.16
4.28s	Welder Standby	28	hours	$0.14	$3.92
Supplies/Materials					
4.31	18" Headwall Meter	1	Ea.	$2,650.00	$2,650.00
4.32	18" PVC 80 PSI PIP Pipe Materials	80	L.F.	$12.15	$972.00
4.33	18" Fresno 4200 Pressure Gates with Stainless Rails and Hardware	1	Ea.	$3,133.00	$3,133.00
4.34	60" Diameter RCP Meter Well	8	L.F.	$125.00	$1,000.00
4.35	Reinforced Concrete for Meter Well	4.5	C.Y	$200.00	$900.00
4.36	Miscellaneous Construction Material including Grout, Stainless Mounting Bolts, etc.	1	Lot	$1,000.00	$1,000.00
Contractual/Construction					
Engineering and Surveying Services for Resaca Outlet by Ferris, Flinn & Medina, LLC					
4.51	Registered Engineer	40	hours	$140.00	$5,600.00
4.52	Sr. Cad Technician	40	hours	$75.00	$3,000.00
4.53	Administrative Assistant	20	hours	$55.00	$1,100.00
4.54	Registered Surveyor	8	hours	$110.00	$880.00
4.55	Sr. Party Chief	20	hours	$70.00	$1,400.00
4.56	Instrument Man	20	hours	$40.00	$800.00
	Subtotal Resaca Outlet				**$28,644.37**

5. Reporting

District Hourly Labor Cost					
5.01	General Manager	24	hours	$26.27	$630.37
5.02	Office Manager	24	hours	$14.66	$351.79
District Fringe Benefit Cost					
5.11	General Manager	24	hours	$10.60	$254.45
5.12	Office Manager	24	hours	$6.98	$167.47
Professional Engineering Services					
5.21	Registered Engineer	40	hours	$140.00	$5,600.00
5.22	Sr. Cad Technician	20	hours	$75.00	$1,500.00
5.23	Administrative Assistant	20	hours	$55.00	$1,100.00
	Total Reporting				**$9,604.08**

Item	Description	Qty	Units	Unit Price	Total Price
6. Seminar on Project Conservation and Metering					
District Hourly Labor Cost					
6.01	General Manager	24	hours	$26.27	$630.37
6.02	Office Manager	8	hours	$14.66	$117.26
District Fringe Benefit Cost					
6.11	General Manager	24	hours	$10.60	$254.45
6.12	Office Manager	8	hours	$6.98	$55.82
Mileage					
6.21	Manager's Truck	200	miles	$0.575	$115.00
Professional Engineering Services					
6.31	Registered Engineer	24	hours	$140.00	$3,360.00
6.32	Sr. Cad Technician	8	hours	$75.00	$600.00
6.33	Administrative Assistant	8	hours	$55.00	$440.00
Use of the HID Rio Grande Center for Ag Water Efficiency					
	Use of Classroom and HID				
6.43	Instructor	12	Hours	$70.00	$840.00
	Total Seminar				**$6,412.91**
7	**Inflation @**	**1.67%**	**of**	**$742,027.79**	**$12,362.43**
8	**Environmental and Regulatory Compliance Cost**	**2.00%**	**of**	**$742,027.79**	**$14,840.56**
	Total Project Budget				**$769,230.77**

Table 9.1
Cameron County Irrigation District No. 6
Salary, Wage and Fringe Details

Position	Hourly Rate	Fringe Benefits Cost per Hour	Total Hourly Rate with Benefits
General Manager	$26.265	$10.602	$36.867
Office Manager	$14.658	$6.978	$21.636
Operator 1	$11.550	$6.246	$17.796
Operator 2	$8.925	$5.319	$14.244
Laborer 1	$9.188	$5.399	$14.587
Laborer 2	$8.159	$5.016	$13.175

Fringe Benefits Breakdown by the Hour

Position	Social Security @ 6.2%	Retire-ment @ 7%	Health @ $386.54 Per Person per Mo.	Paid Leave @ Four Weeks	Uniforms @ $0.055per Employ-ee per Hour
General Manager	$1.628	$1.839	$2.416	$2.650	
Office Manager	$0.909	$1.026	$2.416	$1.478	
Operator 1	$0.716	$0.809	$2.416	$1.183	$0.055
Operator 2	$0.553	$0.625	$2.416	$0.910	$0.055
Laborer 1	$0.570	$0.643	$2.416	$0.936	$0.055
Laborer 2	$0.506	$0.571	$2.416	$0.828	$0.055

Position	Medicare @ 1.45%	Unem-ployment Insuranc e @0.3%	Worker's Compen-sation @ various	Life Insur-ance	*Worker's Compen-sation Rate @*
General Manager	$0.381	$0.079	$1.523	$0.086	*5.80%*
Office Manager	$0.213	$0.044	$0.850	$0.042	*5.80%*
Operator 1	$0.167	$0.035	$0.670	$0.195	*5.80%*
Operator 2	$0.129	$0.027	$0.518	$0.086	*5.80%*
Laborer 1	$0.133	$0.028	$0.533	$0.086	*5.80%*
Laborer 2	$0.118	$0.024	$0.473	$0.025	*5.80%*

Total Working Hours per Year with Four Weeks Leave 1,920.00 Hours

Table 9.2
Equipment Rate Schedule

District Asset Number	United Equipment Description	COE ID No.	COE Equipment Description	Operating Conditions	COE Total Hourly Rate ($/ HR)	
				Average/ Difficult/ Severe	Operating	Standby
T4	Operator's Truck	T50XX002	Truck, Highway, Conventional, 3/4 Ton Pickup, 4x2	Difficult	12.57	1.15
T7	Crew Truck	T50XX009	Truck, Highway, Crew, 1 Ton Pickup, 4x2	Difficult	16.97	0.95
E5	JD 200 LC Excavator (Use COE Linkbelt Model 130 2XLC as Equivalent)	H25LB003	Hydraulic Excavator Crawler 27,100 Lbs., 0.50 Bucket, 18'2" Max Digging Depth	Average	39.93	8.64
E1	Case 590 K Backhoe (Equivalent to COE Case 590 Super M)	L50CS006	Loader/Backhoe, Wheel 1.3 CY Front End Bucket, 24" DIP, 6.4 CF, 18.4 Digging Depth, 4x4 Extendahoe	Average	31.24	5.33
T8	Dump Truck	T50XX032	Dump Truck, Highway, 35,000 GVW, 2 Axle, 4x2 with Rear 10-13 CY Dump Body	Difficult	51.67	5.20
To be purchas-ed	JD 550 Dozer	T15JD007	Tractor, Crawler (Dozer), 90 Hp, Powershift, w/2.6CY Angle Blade	Average	34.48	5.42
NA	Trailer	T45XX025	Truck Trailer, 25 Ton, 2 Axle (Add Towing Truck)	Difficult	5.38	1.58
NA	Welder - Miller Bluestar 3500	W35XX020	Welder, Engine Driven, Gas, AC, 150 Amp, 4.5 KW, Portable, Skid Mount	Average	3.43	0.14
T1	Manager's Vehicle	Use Federal Mileage Rate for Vehicle per Mile			0.575	per mile

Test Results for Saldana Canal West End on 9/5/2014

Date & Time	ΔT	Water Surface Level Mark in Inches (Based on Yard Stick Stuck in Canal)	Seepage Loss in Inches	Approximate Water Surface Elevation in Feet	Canal Water Surface Width in Feet	Δvolume in cubic feet	Bucket Water Evaporation Losses Mark in Inches (Based on Yard Stick Stuck in Canal)	Bucket Water Evaporation Loss in Inches	Δvolume due to Evaporation in cubic feet	Approximate Bucket Water Surface Elevation in Feet	Canal Surface Area at Water Elevation 35.5 in Acres	Linear Feet of Canal	Approx. Water Loss (gallons per minute)
9/5/14 9:49		18.000		35.62	29.50		18.000			35.62	2.49	3,730	
	0.053		0.375			3,432.22		0.125	1,144.07				338
9/5/14 11:05		17.625		35.59	29.39		17.875			35.61	2.49	3,730	
	0.024		0.125			1,141.24		0.125	1,141.24				251
9/5/14 11:39		17.500		35.58	29.35		17.750			35.60	2.49	3,730	
	0.059		0.500			4,550.79		0.000	-				400
9/5/14 13:04		17.000		35.54	29.21		17.750			35.60	2.49	3,730	
	0.018		0.125			1,134.16		0.063	567.08				326
9/5/14 13:30		16.875		35.53	29.17		17.688			35.59	2.49	3,730	
	0.021		0.125			1,132.74		0.000	-				282
9/5/14 14:00		16.750		35.52	29.14		17.688			35.59	2.49	3,730	
	0.021		0.125			1,131.32		0.000	-				282
9/5/14 14:30		16.625		35.51	29.10		17.688			35.59	2.49	3,730	
	0.021		0.188			1,694.33		0.000	-				422
9/5/14 15:00		16.438		35.49	29.04		17.688			35.59	2.49	3,730	
	0.021		0.188			1,691.14		0.000	-				422
9/5/14 15:30		16.250		35.47	28.99		17.688			35.59	2.49	3,730	
	0.021		0.125			1,125.66		0.000	-				281
9/5/14 16:00		16.125		35.46	28.95		17.688			35.59	2.49	3,730	

Total Time Change in Days	**0.26**
Net Seepage Loss in Inches	***1.88***
Net Seepage Loss in Feet per Day	**0.61**
Net Seepage Loss in Acre Feet per Day	**1.51**
Average Net Seepage Loss in Acre Feet Per Day	**1.53**
Average Water Loss in gallons per minute	**343.43**
Average Water Evaporation Loss in gallons per minute	**57.51**

Test Results for Saldana Canal East End on 9/5/2014

Date & Time	ΔT	Water Surface Level Mark in Inches (Based on Yard Stick Stuck in Canal)	Seepage Loss in Inches	Approximate Water Surface Elevation in Feet	Canal Water Surface Width in Feet	Δvolume due to Seepage in cubic feet	Bucket Water Evaporation Losses Mark in Inches (Based on Yard Stick Stuck in Canal)	Bucket Water Evaporation Loss in Inches	Δvolume due to Evaporation in cubic feet	Approximate Bucket Water Surface Elevation in Feet	Canal Surface Area at Water Elevation 35.5	Linear Feet of Canal	Approx. Canal Water Loss (gallons per minute)
9/5/14 10:38		20.000		35.62	29.50		20.000			35.12	2.49	3,730	
	0.029		0.250			2,289.56		0.000	-				408
9/5/14 11:20		19.750		35.60	29.43		20.000			35.12	2.49	3,730	
	0.021		0.125			1,142.66		0.000	-				285
9/5/14 11:50		19.625		35.59	29.39		20.000			35.12	2.49	3,730	
	0.061		0.500			4,556.46		0.000	-				387
9/5/14 13:18		19.125		35.55	29.24		20.000			35.12	2.49	3,730	
	0.017		0.125			1,135.57		0.000	-				354
9/5/14 13:42		19.000		35.54	29.21		20.000			35.12	2.49	3,730	
	0.024		0.063			567.26		0.000	-				125
9/5/14 14:16		18.938		35.53	29.19		20.000			35.12	2.49	3,730	
	0.020		0.188			1,699.64		0.000	-				438
9/5/14 14:45		18.750		35.52	29.14		20.000			35.12	2.49	3,730	
	0.021		0.250			2,261.23		0.000	-				564
9/5/14 15:15		18.500		35.50	29.06		20.000			35.12	2.49	3,730	
	0.021		0.063			564.42		0.000	-				141
9/5/14 15:45		18.438		35.49	29.04		20.000			35.12	2.49	3,730	
	0.021		0.188			1,691.14		0.000	-				422
9/5/14 16:15		18.250		35.47	28.99		20.000			35.12	2.49	3,730	

Total Time Change in Days	**0.23**
Net Seepage Loss in Inches	***1.75***
Net Seepage Loss in Feet per Day	**0.62**
Net Seepage Loss in Acre Feet per Day	**1.55**
Average Net Seepage Loss in Acre Feet Per Day	**1.53**
Average Water Loss in gallons per minute	**353.09**

Cut/Fill Report

Generated: 2014-09-08 20:38:15
By user: agustin
Drawing: F:\0408 Cameron County Irrig. Dist. #6\408-004 Saldana Canal\Dwg\F:\0408 Cameron County Irrig. Dist. #6\408-004 Saldana Canal\Dwg\408-004.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Volume Surf2	full	1.000	1.000	94583.29	0.00	8786.45	8786.45<Fill>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	94583.29	0.00	8786.45	8786.45<Fill>

* Value adjusted by cut or fill factor other than 1.0

El 35.5 to Bottom.

(13847+94583) / 43560 = 2.5 Acres Surface Area

Volume = 993 cy + 8,786 cy = 9779 cy · 27 CF / 1 cy = 264,033 CF.

264,033 CF / 43560 AC/SF = 6.06 Acre Feet

Avg Depth = 6.06 Acre Feet / 2.5 Acres = 2.42 Feet

Cut/Fill Report

Generated: 2014-09-08 20:37:40
By user: agustin
Drawing: F:\0408 Cameron County Irrig. Dist. #6\408-004 Saldana Canal\Dwg\F:\0408 Cameron County Irrig. Dist. #6\408-004 Saldana Canal\Dwg\408-004.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Volume Surf 1	full	1.000	1.000	13847.13	0.00	993.01	993.01<Fill>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	13847.13	0.00	993.01	993.01<Fill>

* Value adjusted by cut or fill factor other than 1.0

El 35.5 to Bottom.

95027443 60 SQF-3

Input - summary

Water volume (max): 40,000 US GPD
Peak month: January
Head: 15 ft
Sun tracking: No (fixed)
Solar data location: FRESNO, Texas, Data source: NREL : 12960

Products

Pump: 60 SQF-3, 1 x 95027443
Solar module: SW80, 39 x 98390060
Switch box / control unit: CU 200, 1 x 96625360

Sizing results - summary

Typical performance at solar radiation 800 W/m²
Flow: 78.4 US GPM
Friction loss: 4.0 ft
Total head: 19.0 ft
Total cable loss: 0.9 %

Water production, Peak flow and Price
Total water production per year: 16120000 gal
Avg. water production per day: 44148 US GPD
Average water production per watt per day: 53.56 l/Wp/day

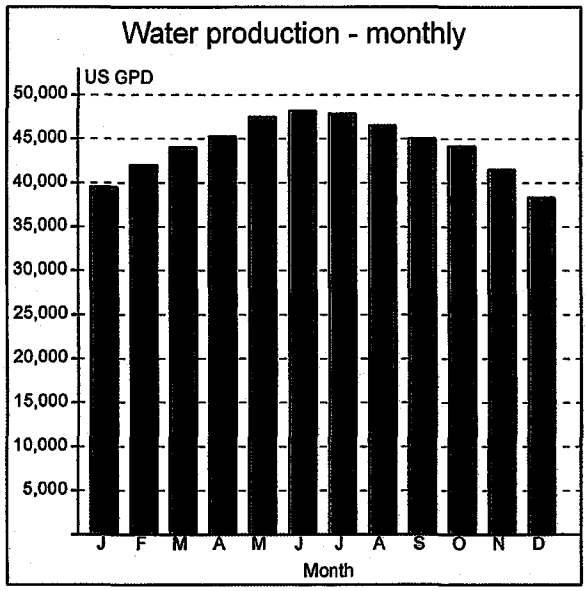
Cables and pipes:
Pump cable (pump - solar array)
Length: 15 ft
Size: 0.75 mm²
Pipe Length: 15 ft

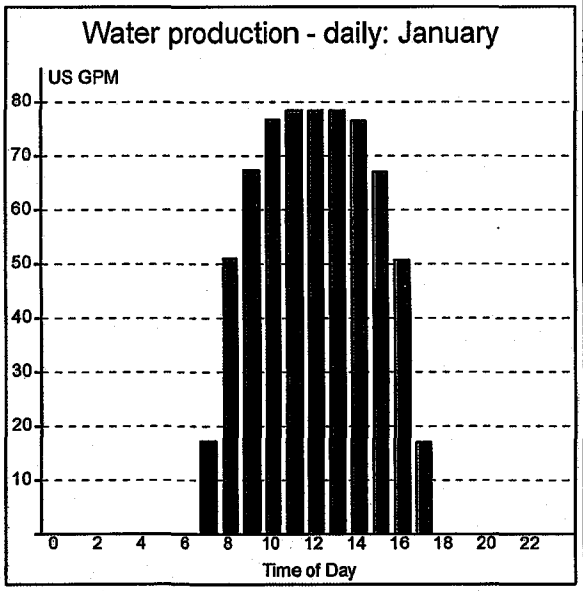
Solar module configuration:
Number of solar modules in series: 13, in parallel: 3
Solar array rated power: 3.12 kW
Solar array rated volts: 232.7 V
Sun tracking: No (fixed)

System performance - monthly average

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Water production [US GPD]	39510	41995	43981	45266	47460	48181	47801	46478	45053	44176	41460	38319
Energy production [kWh/day]	10.6	11.8	12.6	13.3	13.6	13.7	13.6	13.7	13.3	13.1	11.7	10.0
Radiation horizontal [kWh/m² day]	2.7	3.4	4.2	5.0	5.6	6.0	5.9	5.6	4.9	4.2	3.1	2.5
Radiation tilt [kWh/m² day]	4.2	4.5	4.8	5.0	5.1	5.2	5.2	5.4	5.3	5.4	4.7	3.9
Tilt angle [deg.]	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Avg. Temp. [°F]	50.4	54.0	60.6	68.4	74.5	80.4	82.6	82.2	78.3	69.6	61.0	53.4
Temp. Variation [K]	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

AC power (backup) - water production
Recommended minimum output: 2.01 HP
AC 115 V: Produces: 68 US GPM
AC 230 V: Produces: 78.4 US GPM

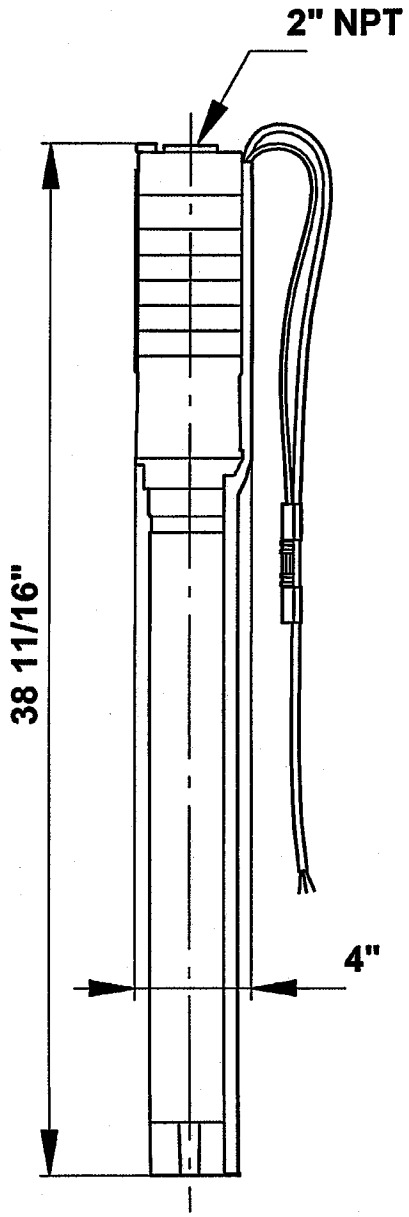




Quotation 1001446195

PUMPS OF HOUSTON INC / RFQ:LOS FRESNO IRRIGATION DISTRICT

Position: 10 95027443 60 SQF-3 2" NPT CPL



Sunmodule®

SOLARWORLD AFRICA®

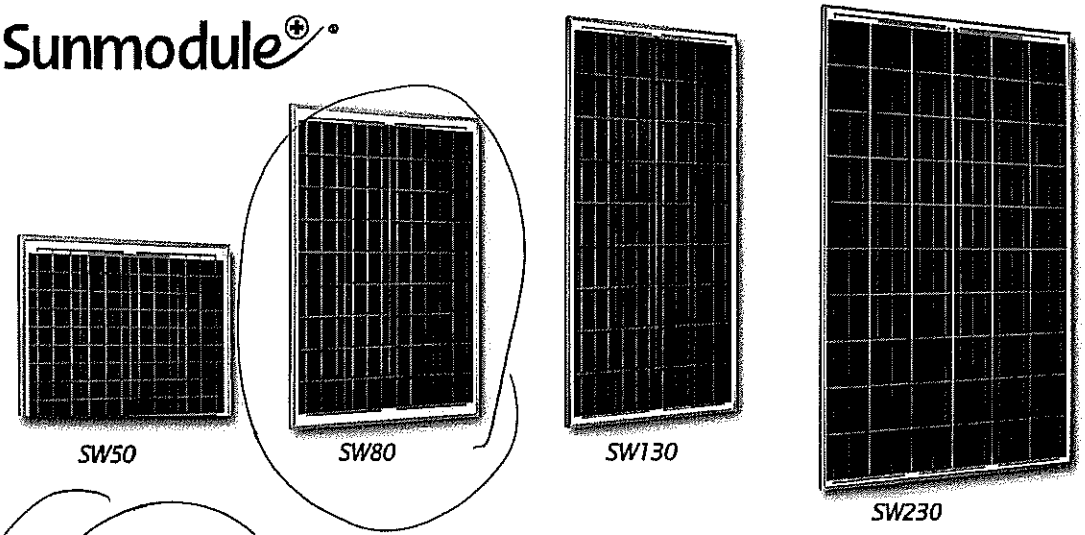
SW50 /80 / 130 & 230 polycrystalline panels

The Sunmodule® series from SolarWorld presents a photovoltaic module series ideally suitable for both off-grid and small on-grid applications. Highest quality standards are applied in the entire manufacturing process. SolarWorld's in-depth expertise ensures best performance and highest energy yields over the entire lifespan, even under challenging climatic conditions.

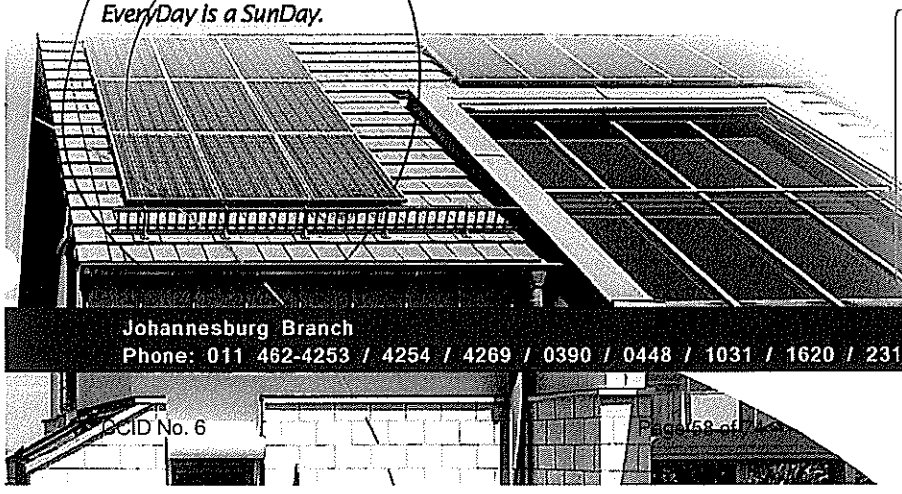
The Sunmodule® is particularly used in industrial applications such as powering offgrid telecom or monitoring systems. It also covers a wide range of rural electrification applications in remote areas, e.g. solar home systems, village power supply, street lighting and many more. The compact dimensions of the Sunmodule® and the solid workmanship of its aluminum frame allow easy and flexible mounting. The design of the water repellent junction box makes wiring easy and secure. The junction box is equipped with two cable glands and two easy to wire spring-type clamps, so no special tools are needed. This simplifies installation and speeds up the installation process.

Model	Maximum power (P_{max})	Open circuit voltage (V_{oc})	Maximum power point voltage (V_{MPP})	Short circuit current (I_{sc})	Maximum power point current (I_{MPP})	Cells per module	Cell type	NOCT Normal operating cell temperature	Dimensions Lenth x Width x Depth
SW50	50Wp	22.1V	18.2V	2.95A	2.75A	36	Poly	46.0°C	680 x 680 x 34mm
SW80	80Wp	21.5V	17.9V	4.82A	4.48A	36	Poly	46.0°C	1058 x 680 x 34mm
SW130	130Wp	21.5V	17.4V	7.99A	7.A	36	Poly	46.0°C	1508 x 680 x 34mm
SW230	230Wp	36.9V	29.8V	8.25A	7.72A	60	Poly	46.0°C	1675 x 1001 x 31mm

Sunmodule®



SolarWorld
EveryDay is a SunDay.



▶▶ Polycrystalline solar cells

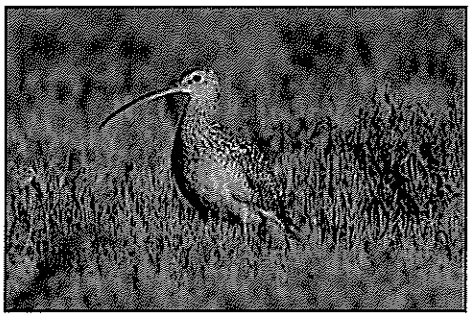
Solar cells that are created from polycrystalline or (multicrystalline) technology are cut from a silicon boule that is grown from multifaceted crystalline material, or a crystal that grows in multiple directions. Conventional multicrystalline solar cells typically have a slightly lower efficiency resulting in larger individual cells and thus typically a slightly larger module. All of this has changed with the advent of the new silicon nitride multicrystalline cells which are rated as high or even higher efficiency than similarly sized monocrystalline cells.

Johannesburg Branch
Phone: 011 462-4253 / 4254 / 4269 / 0390 / 0448 / 1031 / 1620 / 2310 / 2425 / 2503 / 2600

U.S. Fish & Wildlife Service

Lower Rio Grande Valley

National Wildlife Refuge



Lower Rio Grande Valley
National Wildlife Refuge
Route 2, Box 202A
Alamo, TX 78516
956/784-7500
956/787-8338 Fax
http://fws.gov/southwest/texas/santaana.html

Lower Rio Grande Valley National Wildlife Refuge Facts

- Established: February 2, 1979
- Acres: 90,441 (2008 figure) in more than 125 units located in Cameron, Hidalgo, Starr and Willacy Counties, Texas. The Refuge is approved by Congress to pursue an acquisition goal of 132,500 acres by purchasing fee title lands or conservation easements from willing sellers.
- Location: the Refuge office is located at Santa Ana National Wildlife Refuge on Highway 281, 7.5-miles south of Alamo, TX, ¼-mile east of FM 907 (Alamo Road).
- Responsible for managing 1,658 acres of former Wildlife Management Areas for Texas Parks and Wildlife Department.
- In partnership with the City of Roma, the Refuge operates the Roma Bluffs World Birding Center, part of a network of nine unique birding sites set along a 120-mile historic river road from Roma to South Padre Island, Texas.
- The Refuge manages two inland natural salt lakes in Hidalgo and Willacy counties.
- More than 515 species of birds have been recorded in the lower Rio Grande Valley, the most productive birding area in the United States and Canada. The Refuge is recognized as an Important Bird Area by the American Bird Conservancy.
- Refuge tracts in Hidalgo County are managed for wintering shorebird populations of Long-billed Curlew and Wilson's Phalarope, and are part of the Western Hemisphere Shorebird Reserve Network.
- The Battle of Palmito Ranch – the last land battle of the Civil War - took place on May 12-13, 1865 on what is now Refuge property east of Brownsville.
- Recognized as one of the ten most endangered national wildlife refuges by the Defenders of Wildlife in their 2007 Refuges at Risk report.
- Responsible for negotiating with oil and gas industry for mineral exploration/extraction.

Natural History

- Considered one of the most biologically diverse in the entire National Wildlife Refuge System, the Refuge has identified 11 unique biotic communities in the lower Rio Grande Valley to guide land acquisition efforts.
- There are approximately 776 plant species, 50 mammal species, 29 freshwater fish species, and 65 reptile and amphibian species that can be found on the Refuge.
- Major habitat types include Clay Loma/Wind Tidal Flats, Coastal Brushland Potholes, Sabal Palm Forest, Mid-Valley Riparian Woodland, Mid-Delta Thorn Forest, Woodland Potholes and Basins, Upland Thorn Scrub, Barretal, Upper Valley Flood Forest, Ramaderos, and Chihuahuan Thorn Forest.
- Located at the intersection of the Central and Mississippi migratory flyways, the Refuge provides nesting, feeding and loafing areas for millions of migratory and resident songbirds, shorebirds, waterfowl species and water birds.
- The Refuge manages habitats supporting 19 federally threatened and endangered species, and 57 state protected species.

Long-billed Curlew
Photograph by Sanfort
Red-billed Pigeon
Photograph by Larry Ditto
Aplomado Falcon
Photograph by Sanfort

- The Refuge provides habitat for two federally listed endangered cat species, the ocelot and jaguarundi. Kemp's Ridley sea turtles, the most endangered sea turtle species in the world, nest on beaches of the Boca Chica Tract each year.

Financial impact of Refuge

- Annual visitation is approximately 65,000 visitors. Major visitor components are avid bird watchers and nature tourists, hunters, local residents, and Winter Texans.
- 16-person staff.
- Current year budget (FY 2008) $1,263,371.

Refuge Objectives

- Continue to pursue land acquisition goal of 132,500 acres.
- Restore 400 – 600 acres of native habitat annually through cooperative farming program.
- Acquire, protect and enhance Refuge habitat for the protection of endangered species.
- Assist and collaborate with partners in the achievement of a contiguous river wildlife corridor.
- Improve Refuge water quality and water delivery systems, and protect and enhance wetlands.
- Provide wildlife-oriented recreation.
- Provide interpretive and environmental education opportunities.

Management Tools

- Moist soil management
- Cooperative farming
- Water level/water quality programs
- Exotic game species management
- Prescribed burning
- Wetland restoration/management
- Mechanical/chemical control of exotic and noxious plants
- Law enforcement
- Research partnerships
- Volunteer/student intern program
- Education/interpretation
- Partnerships/challenge grants

Public Use Opportunities

The following Refuge tracts are open to the public daily from sunrise to sunset. These remote and unstaffed units of the Refuge have no public facilities. Visitors should bring maps, water, food, and protection from weather and insects. Stay on trails or roads to avoid venomous snakes. Off-road vehicles are prohibited. Do not block gates, and please park vehicles in parking lots or other safe areas.

Boca Chica Tract (Cameron County)
- Loma/tidal flats/coastal dune habitats
- Wildlife observation, photography, beachcombing
- Information kiosk

East Lake/La Sal Vieja Tracts (Willacy County)
- Inland hypersaline lakes
- Hiking/walking trails (accessible by foot only)
- Hunting offered seasonally, permit required
- Birding and wildlife observation
- Parking lot, information kiosk

La Sal del Ray/Schalaben Tracts (Hidalgo County)
- Inland hypersaline lake thorn scrub habitat
- Hiking/walking trails (accessible by foot only)
- Birding and wildlife observation
- Nature photography, interpretive tours (seasonally)
- Parking lot, information kiosk

Monte Christo Tract (Hidalgo County)
- Woodland potholes habitat
- Dove hunting offered seasonally, permit required
- Birding, nature photography
- Hiking/walking trails (accessible by foot only)

Yturria Brush Tract (Hidalgo County, west of La Joya)
- Upland thorn scrub habitat
- Birding and butterfly watching, nature photography
- Hiking/walking trails (accessible by foot only)
- Parking lot, information kiosk

La Grulla Tracts (Starr County)
- Dove hunting offered seasonally, permit required

La Puerta Tract (Starr County, east of Rio Grande City)
- Semiarid barretal habitat
- Hiking/walking trails (accessible by foot only)
- Nature photography, birding and wildlife observation
- Parking lot, information kiosk

Roma Bluffs World Birding Center (Starr County)
- Westernmost unit of the 9-site World Birding Center
- Visitor center, exhibits, nature store
- Interpretive and educational programs
- Guided Rio Grande canoe trips
- Birding information center

Salineño Tract (Starr County)
- Small upper Valley flood forest habitat
- Birding and butterfly watching
- Access to Rio Grande
- Information kiosk, walking trail

Calendar of Events

January: Youth and adult big game hunts

May: International Migratory Bird Day

June – July: Youth Conservation Corps summer student job program

August: Big game hunt applications accepted for fall/winter hunt program

September: Dove hunting season opens

October: National Wildlife Refuge Week

Rio Reforestation public planting event

November – January: Archery and shotgun/muzzleloader big game hunting

December: Christmas Bird Count

For further information

Lower Rio Grande Valley
National Wildlife Refuge
Route 2, Box 202A
Alamo, TX 78516
956/784-7500
956/787-8338 Fax
http://fws.gov/southwest/texas/santaana.html

April 2008

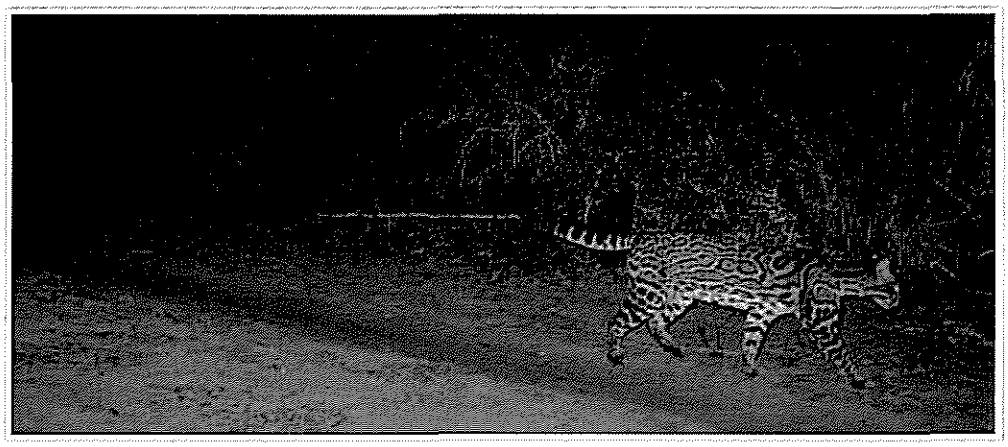
U.S. Fish & Wildlife Service

Lower Rio Grande Valley

National Wildlife Refuge | Texas

A UNIT OF THE National Wildlife Refuge System

Ocelots



Ocelots are beautiful spotted cats that once roamed from South Texas up into Arkansas and Louisiana.

These wild cats are a management priority for the Lower Rio Grande Valley National Wildlife Refuge. Current estimates are that fewer than 50 of these wild cats are left in the U.S., with all of them residing in South Texas.

The single greatest threat to ocelots is loss of habitat. They have no place to go because the native vegetation has been cleared making it hard for them to establish new territories, find the shelter they need to rest, feed and raise their young. That is why habitat restoration is a priority for the refuge. Creating a wildlife corridor and restoring habitat is not just good for ocelots, it's good for all wildlife species that evolved to depend on the south Texas habitat, 95% of which has been cleared in deep South Texas.

The Fish and Wildlife Service is the lead agency responsible for the recovery of this species and works with many partners, public and private, to ensure this beautiful cat will grace the Texas landscape for generations to come.

When visiting the refuge, you may be one of the lucky few to actually see an ocelot. They are quite different than bobcats, another cat species that they are often confused with. Ocelots are smaller than bobcats and have a longer tail. They stand about a foot high and the adults weigh 15-30 pounds and measure about 3' long from their nose to the tip of their tail. They have a long ringed or barred tail and their rounded ears are black with a single, large white spot.

Do you know the difference between an ocelot and bobcat (/uploadedFiles/Ocelot ID Guide_508.pdf)?

Helpful Links

Ocelot Recovery Plan (http://www.fws.gov/southwest/es/Documents/R2ES/Draft_Ocelot_Recovery_Plan-First_Revision.pdf)
Adopt An Ocelot (http://www.friendsofsouthtexasrefuges.org/?id=253)
Ocelot Conservation Festival (http://www.friendsofsouthtexasrefuges.org/default.asp?id=274)

What to do if you do see an ocelot (dead or alive)

Please immediately call any of the following phone numbers:

- Law Enforcement Dispatch: (956)784-7608 or 7520
- After Hours Law Enforcement Dispatch: (956)874-4664
- Laguna Atascosa National Wildlife Refuge: (956)748-3607
- Santa Ana National Wildlife Refuge (http://www.fws.gov/refuge/Santa_Ana/): (956)784-7500

Appendix "D"

Water Conservation Plan

Note: Due to page number limitations the Water Conservation Plan is available upon request.

CERTIFICATE FOR RESOLUTION OF
CAMERON COUNTY IRRIGATION DISTRICT NO. 6

STATE OF TEXAS
COUNTY OF CAMERON

We, the undersigned officers of the Board of Directors of Cameron County Irrigation District No. 6, hereby certify as follows:

1. The Board of Directors of said District convened a Regular Meeting on the 8th day of January 2015, at the regular designated meeting place in said District, and the roll was call of the duly constituted officers and members of said Board, to-wit:

President – Reynaldo L. Lopez
Vice President – Eddie Cruz
Secretary-Treasurer – Joe Collinsworth
Member – Jon Pederson
Member – Bruce Schmitt (absent)

And all of said persons were present, constituting a quorum. Whereupon, the following transacted at said Meeting, a motion was made and seconded that the Board approve the following:

Resolution

WHEREAS, Cameron County Irrigation District No. 6, Cameron County, Texas ("District") is a political subdivision of the State of Texas operating pursuant to applicable State statutes, including Chapters 58 and 49 of the Texas Water Code and Articles XVI, Section 59 of the State Constitution; and

WHEREAS, the Board of Directors of the District ("Board"), which is its governing body desires to file an Application to the Bureau of Reclamation WaterSMART Grant in the amount of $300,000 for Fiscal Year 2015 to include the replacement of the Saldana Canal with a PVC Pipeline, a new aerial crossing to eliminate the Saldana Pump, a solar powered Second Lift Pump and an Outlet for the USFWS Lower Rio Grande Valley Wildlife Refuge.

WHEREAS, the Board desires to approve the Application for submission to the Bureau of Reclamation (Bureau) and endorse it for approval by Bureau

NOW, THEREFORE, BE IT RESOLVED, that the President of the Board is the District's representative and is hereby authorized to enter into any and all agreements or other documents pertaining to the Application and consummation of Project work and necessary funding related thereto; that the Board and General Manager of the District have reviewed and support the Application to appropriate officials; the District has the capability to provide the amount of funding and/or income contribution specified in the funding plan included in the Application; and the Board will work with the Bureau to meet established deadlines for entering into Cooperative Agreement and the General Manager of the District is hereby instructed to work with the Bureau to meet established deadlines for entering into Cooperative Agreement and do any and all things necessary to accomplish consummation of all requirements of the Application and Project work pursuant to the Application, Project funding, and all related matters.

And, after due discussion, said motion, carrying with it the passage of said Resolution prevailed and carried by the following vote:

AYES: 4

NOES: 0

ABSENT: 1

That the above and foregoing paragraphs are a true, full and correct copy of the aforesaid Resolution and Order adopted at the Meeting described above, that said Resolution and Order has been duly recorded in said Board's Minutes of said Meeting, that the above and foregoing paragraphs are a true, full and correct excerpt from said Board's minutes of said Meeting pertaining to the passage of said Resolution and Order, that the persons named in the above and foregoing paragraphs are the duly chosen, qualified and acting officers and members of said Board as indicated therein; that each of the officers and members of said Board was duly and sufficiently notified, officially and personally, in advance, of the time, place, and purpose of the aforesaid Meeting, and each of said officers and members consented, in advance, to the holding of said Meeting for such purpose; and that said Meeting was open to the public and public notice of the time, place, and purpose of said meeting was given, all as required by Chapter 551, Government Code, *Vernon's Ann. Cov. Statutes.*

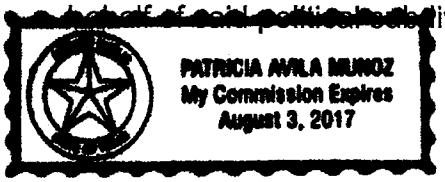
SIGNED AND SEALED the 8TH day of January, 2015

Joe Collinsworth, Secretary

Reynaldo L. Lopez, President

STATE OF TEXAS
COUNTY OF CAMERON

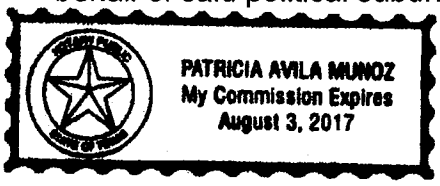
This instrument was acknowledged before me on the 8th day of January 2015, by Joe Collinsworth, Secretary of the Board of Directors of Cameron County Irrigation District No. 6, a political subdivision of the State of Texas, on behalf of said political subdivision.



Notary Public in and for the State of Texas

STATE OF TEXAS
COUNTY OF CAMERON

This instrument was acknowledged before me on the 8th day of September 2015, by Reynaldo L. Lopez, President of the Board of Directors of Cameron County Irrigation District No. 6, a political subdivision of the State of Texas, on behalf of said political subdivision.



Notary Public in and for the State of Texas

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

January 6, 2015

Mr. Tito Nieto
District Manager
Cameron County Irrigation District No. 6
P. O. Box 295
Los Fresnos, Texas 78566

Re: Texas Water Development Board's Research and Planning Fund, Fiscal Year 2015, Agricultural Water Conservation Grants, TRD-201403009, TWDB Grant Application 00003972

Dear Mr. Nieto:

Congratulations! The Texas Water Development Board approved an agricultural water conservation grant in the amount of $150,000.00 for your application. The contract must be executed no later than May 31, 2015.

Currently, TWDB staff is drafting a contract for your review. If you have any questions or concerns, please contact me at (512) 936-6090.

Sincerely,

David Carter
Agency Contract Administrator

c: Frank Ferris, P.E.
Cameron Turner, TWDB

CAMERON COUNTY IRRIGATION
DISTRICT NUMBER 6

STATEMENT OF NET POSITION

DECEMBER 31, 2013

	Primary Government	
	Business-type Activities	Total
ASSETS		
Cash and investments	$ 449,117	$ 449,117
Receivables		
Accounts	22,923	22,923
Flat rate assessment	176,316	176,316
Restricted investments	3,699,113	3,699,113
Deferred charges	7,846	7,846
Capital assets:		
Land	14,185	14,185
Canal system and plant	1,107,634	1,107,634
Construction in progress	121,814	121,814
Office buildings and improvements	84,218	84,218
River plant house	25,550	25,550
Equipment and trucks	971,519	971,519
Less: accumulated depreciation	(870,891)	(870,891)
Total capital assets	1,454,029	1,454,029
Total assets	5,809,344	5,809,344
LIABILITIES		
Accounts payable	23,813	23,813
Accrued liabilities	6,168	6,168
Prepaid flat rate assessment	112,934	112,934
Unearned revenue	83,968	83,968
Total liabilities	226,883	226,883
NET POSITION		
Net investment in capital assets	1,454,029	1,454,029
Restricted for:		
Capital improvements	3,699,113	3,699,113
Unrestricted	429,319	429,319
Total net position	$ 5,582,461	$ 5,582,461

The notes to the financial statements are an integral part of this statement.

Frank Ferris

From: Eduardo Alvarez [ealvarez@ealvarezsales.com]
Sent: Tuesday, January 20, 2015 10:13 AM
To: Frank Ferris
Subject: Re: CCID #6

15" - $ 7.90 (1.40)
18" - $ 12.15 (4.32)
24" - $ 21.99 -Truckload = 704 LF = 15,480.96 (1.39)

Sent from my iPad

On Jan 19, 2015, at 3:52 PM, Frank Ferris <f.ferris@ferrisandflinn.com> wrote:

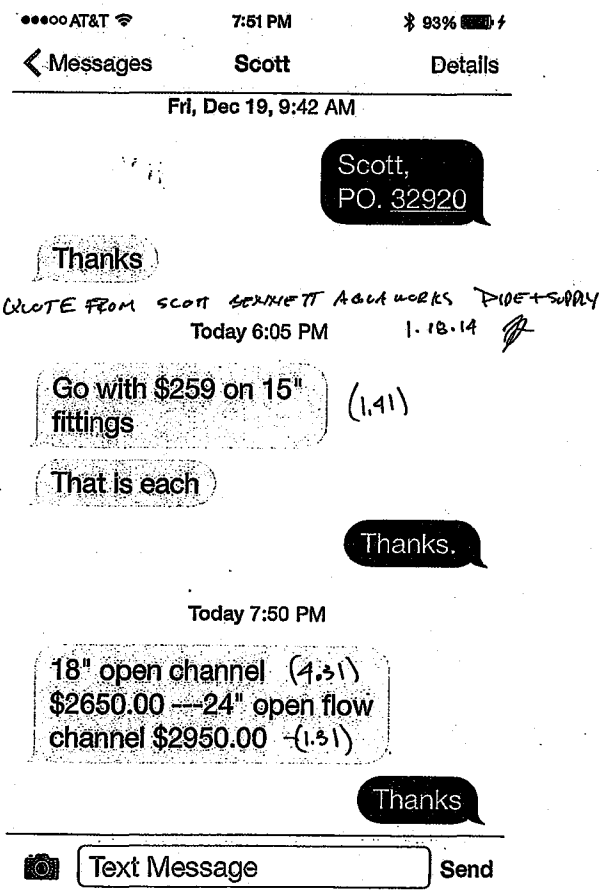
<image001.gif>
Hello Eddie

I am working on a grant project. What are your current truckload prices for

15" 80 PSI
18" 80 PSI and
24" 80 psi.

Thanks.

Frank A. Ferris, PE
President
FERRIS, FLINN & MEDINA, LLC
1405 N. Stuart Place Road
Palm Valley, TX 78552
956 364 2236
Fax 956 364 1023
Texas Board of Professional Engineers Firm No. F-897



Frank Ferris

From: David Lott [DavidBL@fresnovalves.com]
Sent: Tuesday, January 20, 2015 11:28 AM
To: f.ferris@ferrisandflinn.com
Subject: FW: Quote for Cameron County Irrigation District No. 6

Frank- The Alfalfa Valves will be net $ 216.00 each. Thank You David $+50^{00} = 265^{00} (1.36)$
Per David Lott, add 250 total for shipping 5 = 50.00 each.

From: Rich Korbe
Sent: Monday, January 19, 2015 4:39 PM
To: David Lott
Subject: RE: Quote for Cameron County Irrigation District No. 6

David,

See below for pricing. You'll have to get him the alfalfa valve pricing.
I would estimate the freight at about $750.00.

Rich Korbe
Fresno Valves & Castings, Inc.
P: 559-834-2511
richjk@fresnovalves.com

From: David Lott
Sent: Monday, January 19, 2015 2:10 PM
To: Rich Korbe

I am working on a grant application for CCID # 6 and would like a quote for the following. Your best guess on shipping is appreciated. One load is fine or two if it is coming from two locations. Assume all the handwheels are 12 feet above the gate CL.

Freight = 15 gate for 750 = 50.00 each

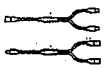
2- 24" 4200 with stainless rails and brass seats ($5142.00 list) $+50 = 5,192 (1.33)$
7- 18" 4200 with stainless rails and brass seats ($3083.00 list) $+50 = 3,133 (1.34) + (9.33)$
6- 15" 4200 with stainless rails and brass seats (We do not offer 15" Series 4200 gates; price for 16" gate = $2771.00 list) $+50.00 = 2821 (1.35)$
5- 14" x 15" Alfalfa Valves. (David, you'll have to price this. I know nothing about alfalfa valves).

Thanks.

Frank A. Ferris, PE
President
FERRIS, FLINN & MEDINA, LLC
1405 N. Stuart Place Road
Palm Valley, TX 78552
956 364 2236
Fax 956 364 1023
Texas Board of Professional Engineers Firm No. F-897

Quotation 1001446195

PUMPS OF HOUSTON INC / RFQ:LOS FRESNO IRRIGATION DISTRICT

Position	Product Code	Quantity	Estimated Ship Date	List Price	Total Price
10	95027443 60 SQF-3 2" NPT CPL CU200 control unit mk2 solar w/fs 98390060 GF80S Crystalline Array to Terminal wire kit Array to array wire kit (MC4) Array to controller wire kit (MC4) Top Pole Mount for 3xSW80 (US) Available FRESNO.	1		$3,801.00	$3,801.00
					
20	96625360	1		$645.00	$645.00
	Available FRESNO.				
					
30		39		$230.00	$8,970.00
	Lead Time: Available FRESNO and ALLENTOWN.				
40	98390224	39		$37.50	$1,462.50
	Lead Time: Available FRESNO.				
					
50	98257892	2		$95.00	$190.00
	Lead Time: Available FRESNO.				
					
60	98257868	1		$108.00	$108.00

3,31 cont

Quotation 1001446195

PUMPS OF HOUSTON INC / RFQ:LOS FRESNO IRRIGATION DISTRICT

Position	Product Code	Quantity	Estimated Ship Date	Discount Multiplier	List Price	Total Price
	Lead Time: Available FRESNO.					
70	98544100	13			$557.00	$7,241.00
	Lead Time: Available FRESNO.					
Total				(3,31)		$22,417.50

AGUAWORKS PIPE & SUPPLY
2907 NORTH CENTRAL AVENUE
BROWNSVILLE, TX

78526

Telephone: 956-831-2500

1/19/15 Bid ID: 5008808 4" SCH80

Line	Quantity	Sell Per	Description	Price Per	Unit Price	Extended Price
20	200	FT	4" X 20' PE SCH80 PVC PIPE		3.44	688.00
40	4	EA	4" SCH80 PVC SXS 90 ELL 806-040		18.03	72.12
60	1	EA	4X2 SCH40 SPXFIPT BUSHING		20.18	20.18
80	1	EA	4" SCH80 BALL CHECK STD		683.00	683.00

(3.33)

(3.34)

CAPA
CONCRETE ▲ ASPHALT ▲ TILE ▲ AGGREGATES

7301 W. EXPRESSWAY 83, MISSION, TX. 78572
PHONE (956) 584-5770, FAX (956) 583-2086

Precast Reinforced Concrete Pipe - Rubber Gasket

Nomial Size		Delivered to: ZONE 1			
S.A.E.	Metric	Class III	Class IV	Class V	WEIGHT
12"	300 mm	$ 13.60	$ 17.50	$ 19.30	960
15"	375 mm	$ 16.00	$ 20.25	$ 22.10	1,520
18"	450 mm	$ 18.40	$ 23.00	$ 24.85	1,920
24"	600 mm	$ 24.00	$ 29.45	$ 31.30	2,840
30"	750 mm	$ 35.90	$ 39.55	$ 43.15	4,020
36"	900 mm	$ 52.05	$ 58.90	$ 61.30	5,520
42"	1050 mm	$ 67.30	$ 72.25	$ 82.90	7,100
48"	1200 mm	$ 82.30	$ 91.10	$ 104.70	8,280
54"	1350 mm	$ 98.10	$ 111.60	$ 127.50	9,800
60"	1500 mm	$ 122.95	$ 138.70	$ 164.25	12,184
72"	1950 mm	$ 169.85	$ 195.80	$ 240.25	15,900
78"	2100 mm	$ 208.30	$ 241.80	Call for Pricing	19,280

(1.39) Round up to $40.00

(4.34) Round up to $125.00

CONTACT US

Free Construction Cost Data

All Cost's Free Construction Cost Data

(3.36)

Home | Browse Costs | Search Costs

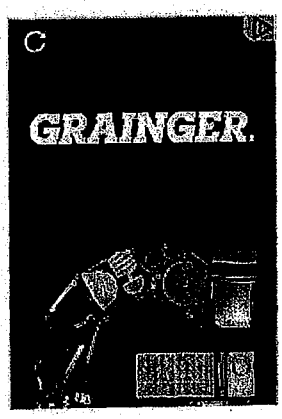
Browse Section: Furnish and install well casing

Furnish and install well casing

Monitor well, SST well casing, 12" dia, flush threaded, 5' section

Item	Rate
Material	255.55 / LF
Other	0.00 / LF
Total	**255.55 / LF**

end of record



flexicore OF TEXAS
CONCRETE SOLUTIONS SINCE 1953

P.O. Box 450049
Houston, Texas 77245
www.flexicoretx.com

281-437-5700
888-FLXICOR
281-437-8913 Fax
832-671-9575 Cell
dedsall@flexicoretx.com

JOB QUOTATION

To: Ferris and Flinn
Attn: A Valdez

Estimate No.: 2015.009
Bid Date: 1/20/2015
Terms: Net 30
FOB Point: Jobsite

We propose to furnish the following described materials at prices and conditions as stated below for use in construction of: Los Fresnos Pile
Located at: Los Fresnos, TX
Engineer or Architect: Unknown
Terms of payment payable Houston, TX: Unless noted, applicable federal, state and local taxes NOT included.

Quantity	Unit	Description	Unit Price	Total
280	LF	16" Sq. X 40' Prestressed Concrete Piling - 7 Pile Approximate Weight Each: (265 lbs./LF) lbs. Price Includes: Concrete with Type III Cement and Class F Fly Ash; 4000/5000 psi Concrete Strengths; 16" Pile strand to be 8 each, 1/2" dia, 270 K to 31 kips ea. Based on TXDOT Standard Pile. NOT AN ENGINEERED DESIGN. BUDGETARY QUOTE	$33.84	$9,475.20

7 each @ 40' LONG.

Frank Ferris

From: Agustin Valdez [A.Valdez@ferrisandflinn.com]
Sent: Tuesday, January 20, 2015 11:45 AM
To: 'Frank Ferris'
Subject: 408-004 CCID6 Steel Pipe Quote

Mr. Ferris,

Jay with J.D. Fields (1-281-558-7199) provided the following quote for 24" dia. x ½ wall steel pipe:

$66.00 per foot no delivery
$71.00 per foot including delivery

Agustín Valdez
Sr. CAD Tech
FERRIS, FLINN & MEDINA, LLC
ENGINEERS SURVEYORS
TEXAS BOARD OF PROFESSIONAL ENGINEERS
TBPE FIRM REGISTRATION NO.: F-897
TEXAS BOARD OF PROFESSIONAL LAND SURVEYING
TBPLS FIRM REGISTRATION NO.: 100370-00
Phone: 956-364-2236
Fax: 956-364-1023
E-mail: a.valdez@ferrisandflinn.com
Website: www.ferrisandflinn.com
Address: 1405 N. Stuart Place Road
Palm Valley, Texas 78552

ENGINEER'S ESTIMATE
AERIAL CROSSING
MATLS. –
PIPE = 7100 x 350 = 24,850
PILES 280LF @ 33.84 = 9,475.2
CONCRETE SUPPORTS EACH END =
4' x 6' x 8' x 2 EACH / 27 CY/CF = 14.2 CY · 200 = 2,844
TOTAL MATLS = 37,169
X 125% OH+P = 46,461.25

Mobilization + Demobilization = $30,000

Pile Hammer 70 HRS @ 97.00
CRANE 70 HRS @ 188.00
EXCAVATOR LONG REACH 40 HRS @ 107.00
TRUCK 5C 100 HRS = 500 @ 27.00
4CY LOADER = 100 HRS @ 75.00
DOZER = 100 HRS @ 43.00
Project Engineer = 129 @ 72.00
Project Surveyor = 129 @ 32.00
DUMP TRUCK DRIVER = 450 @ 38.00
EXCAVATOR OPERATOR = 40 @
LOADER OPERATOR = 190 HRS @ 34.00
DOZER OPERATOR = 90 HRS @ 35.00
CRANE OPERATOR = 70 HRS @ 60.00
CREW TRUCK 240 HRS @ 16.00
4 MAN CREW - SKILLED = 240 HRS @ 81.00
SUPER — 240 HRS @ 13.5

Point

Foreman @

Item 2.31 (Remaining Pages in Appendix H support this estimate.

Breakdown for Appendix H Aerial Crossing

Use Foremost Paving Unit Prices except FEMA for Barge and Boat

Item	Qty	Units	Description	Unit Price	Total Price
Materials					
1	350	LF	Steel Pipe	$71.00	$24,850.00
2	280	LF	Conrete Piling	$33.84	$9,475.20
3	20	CY	Reinforced Concrete	$200.00	$4,000.00
4	1	Lot	Miscellaneous Materials	$5,000.00	$5,000.00
	Subtotal Materials			$43,325.20	
	Add 25.00%		Ovehead Bond and Profit	$10,831.30	
			Total Material Cost		**$54,156.50**
Equipment					
5	70	Hours	Pile Hammer	$97.00	$6,790.00
6	70	Hours	100 Ton Crane	$188.00	$13,160.00
7	40	Hours	Long Reach Excavator	$107.00	$4,280.00
8	450	Hours	22 yd Dump Trucks	$27.00	$12,150.00
9	90	Hours	4 CY Loader	$75.00	$6,750.00
10	90	Hours	Dozer	$43.00	$3,870.00
11	200	Hours	Work Barge	$39.50	$7,900.00
12	200	Hours	Boat	$27.00	$5,400.00
13	240	Hours	Crew Truck	$16.00	$3,840.00
14	240	Hours	Pickup Truck	$13.50	$3,240.00
			Total Equipment Cost		**$67,380.00**
Labor					
7	24	Hours	Project Manager	$91.00	$2,184.00
8	24	Hours	Project Engineer	$72.00	$1,728.00
9	24	Hours	Project Surveyor	$32.00	$768.00
10	24	Hours	Rodman	$28.00	$672.00
11	48	Hours	Superintendent	$81.00	$3,888.00
12	240	Hours	Foreman	$58.00	$13,920.00
13	960	Hours	Skilled Labor	$32.00	$30,720.00
14	450	Hours	Dump Truck Driver	$32.00	$14,400.00
15	40	Hours	Excavator Operator	$38.00	$1,520.00
16	90	Hours	Loader Operator	$34.00	$3,060.00
17	90	Hours	Dozer Operator	$35.00	$3,150.00
18	70	Hours	Crane Operator	$60.00	$4,200.00
			Total Labor Cost		**$80,210.00**
Add Paint and Welding Subcontractor including OH&P					**$15,000.00**
Add Mobilization and Demobiliazation					**$25,000.00**
Subtotal for all of the above					**$241,746.50**
Add Bond Cost for above @				1.35%	$3,252.00
Total Aerial Crossing Cost					**$244,998.50**
Legnth			350 LF		
Total Cost per Linear Feet					**$700.00**