WaterSMART: Water and Energy Efficiency Grants for FY2013 – Funding Group II

United Irrigation District

Canal Lining, Main Flume Improvement, First Lift Suction Lining, Wind Powered Second Lift Pump, Solar Powered SCADA Components, Refuge Outlet and Conversion & Sale of Water Rights

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(1) Technical Proposal: Executive Summary
Date: January 17, 2013
Applicant: United Irrigation District
1006 West 2 Mile Line, Mission
Hidalgo County, Texas

The United Irrigation District is proposing a Funding Group II Project to conserve water and energy. The project will result in conservation of 2,512 acre feet per year of water and 309,710 kilowatt hours per year of energy. Through the lining of 4.5 miles of open canal, the improvement of a flume on the District's Main Canal and the automation of the Bryan Canal Radial Gate, the conservation of water designated in Task "A" is achieved. Addition of Supervisory Control and Data Acquisition (SCADA) monitoring at the Second and Third Lift Stations and control of the Bryan Canal Radial Gate will result in better managed water; further achieving the goals in Task "A". The project replaces 7,942 kilowatt hours of conventional energy per year by utilizing a wind powered pump and 1,752 kilowatt hours of energy per year will be generated by the solar powered SCADA units. Task "B" is accomplished by the renewable energy and as a result of the energy conservation. In addition to the canal lining and wind powered pump, 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 will convert 1,000 acre feet of agricultural water rights to municipal rights and market the 500 acre feet of municipal rights in the Lower Rio Grande Basin. Through the marketing of these rights, Task "D" is achieved and will result in a monetary gain of approximately $1,139,500 to be utilized towards the District's share of this project. The proposed Year 1 schedule includes a component that accomplishes each Task at a cost of $1,193,232.77. Year 2 and 3 improvements will result in an overall project budget of $2,778,961.85. The District is requesting a Federal Share of 48%. The project may begin immediately upon Grant Agreement execution.

(2) Background Data
United Irrigation District of Hidalgo County (the District) is located in the Lower Rio Grande Valley Region with its main office located in Mission, Texas. Figure 1 provides a general location map of the District as well as the proposed improvements. The District boundary encompasses 34,920 acres. The District currently serves 23,650 acres of irrigated farmland where farmers grow citrus, vegetables, sugar cane, sorghum, corn and hay.

The District also provides raw water to the potable water suppliers of the City of Mission, Sharyland Water Supply Corporation and the City of McAllen. Currently the District owns water rights to divert water from the Rio Grande in the amount not to exceed 69,491 acre feet per year for irrigation purposes and 13,629 acre feet for municipal, domestic and industrial purposes. Over the past five years, the District has diverted from the Rio Grande an average of 39,200 acre feet for all purposes.

The District's delivery system begins with the First Lift Plant that has a total capacity of 378 cubic feet per second, shown in Figure 1 on the Rio Grande. When the water is delivered to the District's main canal, it is located in downtown Mission at the District's Second Lift Plant, which feeds approximately 85% of the demand in the District.

The Third Lift Plant is located near the District office on Mile 2 Road and serves the northwest portion of the District. The estimated length of the entire water distribution system, canal and pipeline facilities is 165 miles.

United Irrigation District is a result of the combination of Hidalgo County Irrigation Districts No. 7, formed in 1927 and No. 14, formed in 1931. In March of 1987, a consolidation agreement between the two Districts occurred and the newly combined entity was renamed United Irrigation District. United Irrigation District currently operates under Chapters 49 and 58 of the Texas Water Code and Article XVI, Section 59 of the Constitution of the State of Texas.

The District's total current water rights amount to 69,491 acre feet to irrigate 27,795 acres within its boundaries. The District also holds the rights to 13,629 acre feet of water for municipal, domestic and industrial purposes that are perpetually contracted to existing customers. In addition to its water rights, the District also delivers approximately 21,600 acre feet of water to its three municipal customers as follows: 14,000 acre feet per year to the City of Mission, 5,200 acre feet per year to Sharyland Water Supply Corporation and 9,000 acre feet per year to the City of McAllen.

Sharyland Water Supply Corporation is currently constructing an additional water treatment plant that is anticipated to have a capacity identical to its first plant. The historical diversion and delivery of water by United Irrigation is presented in Table 1.

United Irrigation District has a good working relationship with the US Bureau of Reclamation. The District currently has an ongoing project for nearly $15 million; of which 50% is being funded by the US Bureau of Reclamation under the Lower Rio Grande Valley Water Resources Conservation Improvements Act of 2000 (LRGVWRCIA 2000). The District has completed approximately $3.4 million dollars worth of construction under this grant but funding of the federal share is about four years lagging. The District has completed the Main Canal Phases 1 and 2a, Lateral 3 ¼ North Phase I, Lateral 3 ½ North Phase I and the Shary 3rd Canal Phases I and II and the First Lift Pump Station. In cooperation with the Bureau, the District has amended plans for the completed projects to result in savings in excess of one million dollars to be applied to future projects.

The District includes about 165 miles of canal and pipeline and continues to replace older and leaking facilities as it can afford for conservation efforts. The main pump stations are maintained with energy demand as follows:

First Lift	1 – 500 Hp Electric
	1 – 500 Hp Electric Variable Frequency Drive
	1 – 500 Hp Natural Gas
Second Lift	1 – 350 Hp Electric
	1 – 350 Hp Electric
	1 – 350 Hp Natural Gas
	1 – 350 Hp Natural Gas
Third Lift	1 – 150 Hp Electric
	1 – 200 Hp Natural Gas
	1 – 150 Hp Natural Gas
	1 – 350 Hp Electric

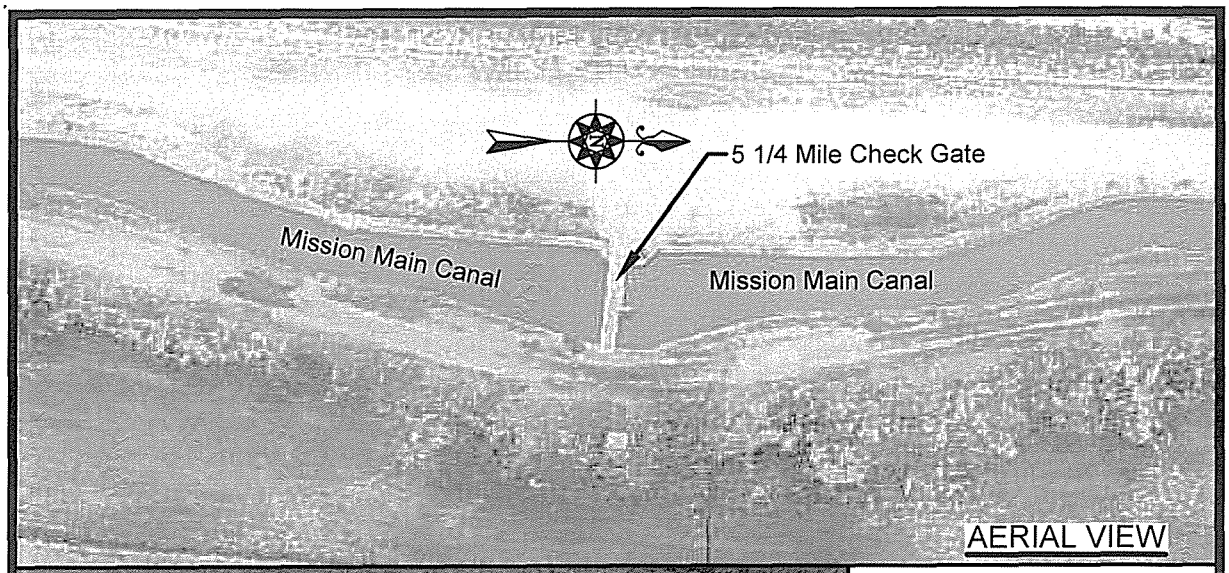
Note the above ratings are approximate Hp demand even though the actual engine rating may be greater. Both electric and natural gas engines are used for two reasons; first, if one source fails, water can still be pumped using the other source. Secondly, both electric and natural gas rates vary, and having both allows the District to choose the most economical energy source. The District's annual energy consumption is about 4,000,000 kilowatt hours per year including both electric and natural gas.

(3) Technical Project Description

(a) General Description

This project consists of water and energy conservation and other components that meet the goals of the 2013 WaterSMART Funding Opportunity Announcement. The first component of the project is the placement of lining on four and one half miles of canal to conserve water and energy. The second component of the project is the improvement of the Main Flume with a new double barrel siphon. The third component is the lining of suction lines at the first lift station to conserve energy and improve reliability. The fourth component of the project is the addition of a wind powered pump at the second lift station to utilize renewable energy. A fifth component of the project is the addition of SCADA remote units with the Second Lift, Third Lift and the Bryan Canal Radial Gate to conserve and better manage water. A sixth component of the project is the construction of an outlet to the LRGVNWR to benefit the Ocelot as well as other endangered species. The final component of the project is conversion of agricultural rights to municipal rights and marketing the converted rights to a municipal user.

The District has several sections of canal that are experiencing high seepage and are in need of lining. The existing lining has cracked causing the canals to seep, resulting in water loss and energy wasted in pumping the lost water. The three sections of canal have been identified in Figure 1. Photographs of the canals and test locations are provided in Figures 2 and 3.



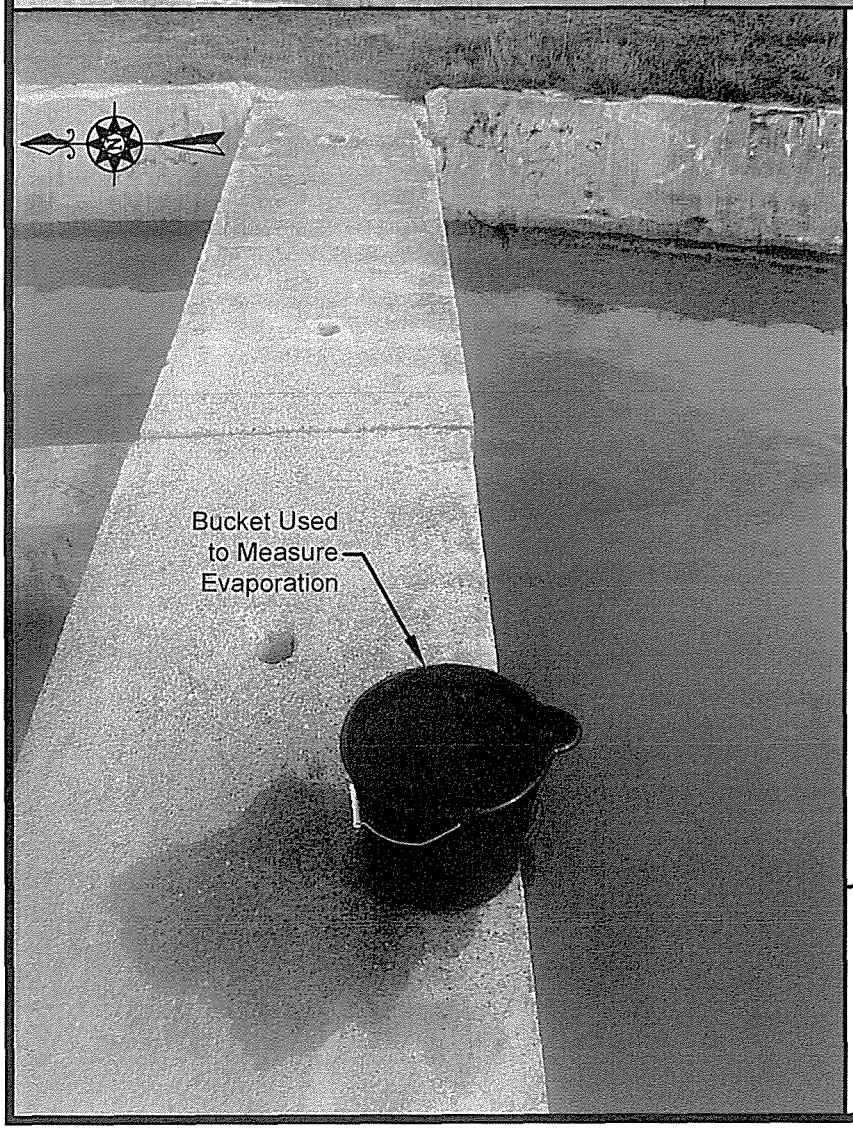


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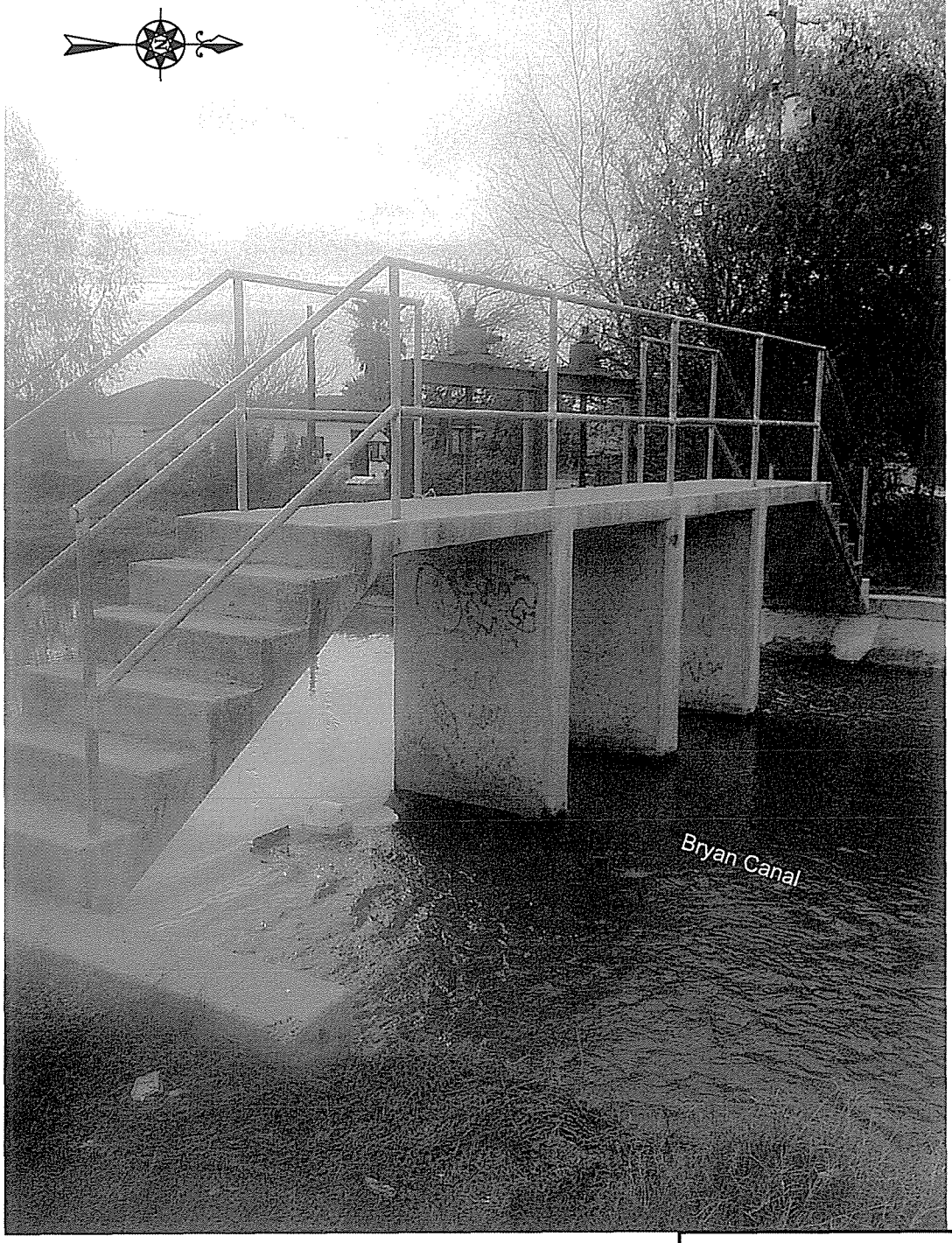
Figure 2
Mission Main Canal
5 ¼ Mile Check



Note:
Test did not begin until water stopped overflowing check.

UID
Figure 3
Bryan Canal
5 Mile Check

The sections of the canal to be relined are as follows:

1.94 Miles Mission Main South of 5 ¼ (MMS)
1.48 Miles Mission Main North of 5 ¼ (MMN)
1.10 Miles Bryan Canal

The District tested the canals' leakage during a period where there was no demand. The test data can be found in Appendix "A". During the test procedure, the canals were filled to the downstream check gate and the water level was monitored over time. Loss rates averaging 517 acre feet per mile per year were selected based on the test data in Appendix "A" along with knowledge of canal operation and the length of time the canal is in service each year. Typically the District's main canals are fully charged due to year around irrigation and municipal deliveries and are only taken out of service for repairs. For the purposes of water conservation calculations, it is considered that seepage occurs 365 days out of the year.

The proposed liner will be a thin layer of concrete with fibermesh as an additive. Fibermesh is a synthetic multifilament fiber than can be added to concrete and has only been in use the last 15 years or so. Tests run at San Jose State University and the University of California, Berkeley, show, without exception, that fibermesh concrete typically inhibited cracking in the range of 90% to 100% compared to the non-fiber control specimen. In addition, Tests by Webster Engineering and Associates. Inc. have shown that the addition of fibermesh fibers to plastic concrete substantially increases the resistance of the concrete to early age plastic shrinkage cracking and cracking in response to vibration at early ages.

The current base concrete structure will remain, as it includes steel reinforcing and adds to structural strength. It is expected that the fibermesh/concrete lining will reduce seepage by 85%, as there may be some seepage through canal gates. An inspection of the length of the test canal was performed and it was found that there was no visible leakage through gates during the test. An evaporation analysis was performed by placing a bucket adjacent to the test area. No significant evaporation was recorded during the test period.

Table 2 provides the summarized test results and the anticipated water conservation by relining this section of the canal. There has been great success with similar lining projects in South Texas using 2 inches of 4,000 psi shotcrete with 1.5 pounds per cubic yard of fibermesh and ½ inch aggregate.

The order of lining projected by year is as follows:

Year 1	1.94 Miles Mission Main South of 5 ¼
Year 2	1.48 Miles Mission Main North of 5 ¼
Year 3	1.10 Miles Bryan Canal

This priority is selected based on the fact that the higher priority projects will be less available for shut downs in the future. The Sharyland Water Supply Corporation is constructing a water treatment plant at the Five Mile Line; this plant should be operational near the end of Year 1. As shown in Table 2, each section of the canal will result in significant water conservation yielding an anticipated annual savings of 2,338 acre feet. Energy will be saved as a direct result of water conservation. The amount of energy conserved is discussed in further detail in Evaluation Subcriterion B. 2.

A second component of the project is the Main Flume Improvement Project. This component is a water and energy conservation project. More importantly, this component is a reliability concern for the District. Ninety five percent of the District's demand is downstream of this flume, which has failed twice in the past ten years. When the flume fails, all water is lost from the First Lift Pump Station to the Second Lift Pump Station.

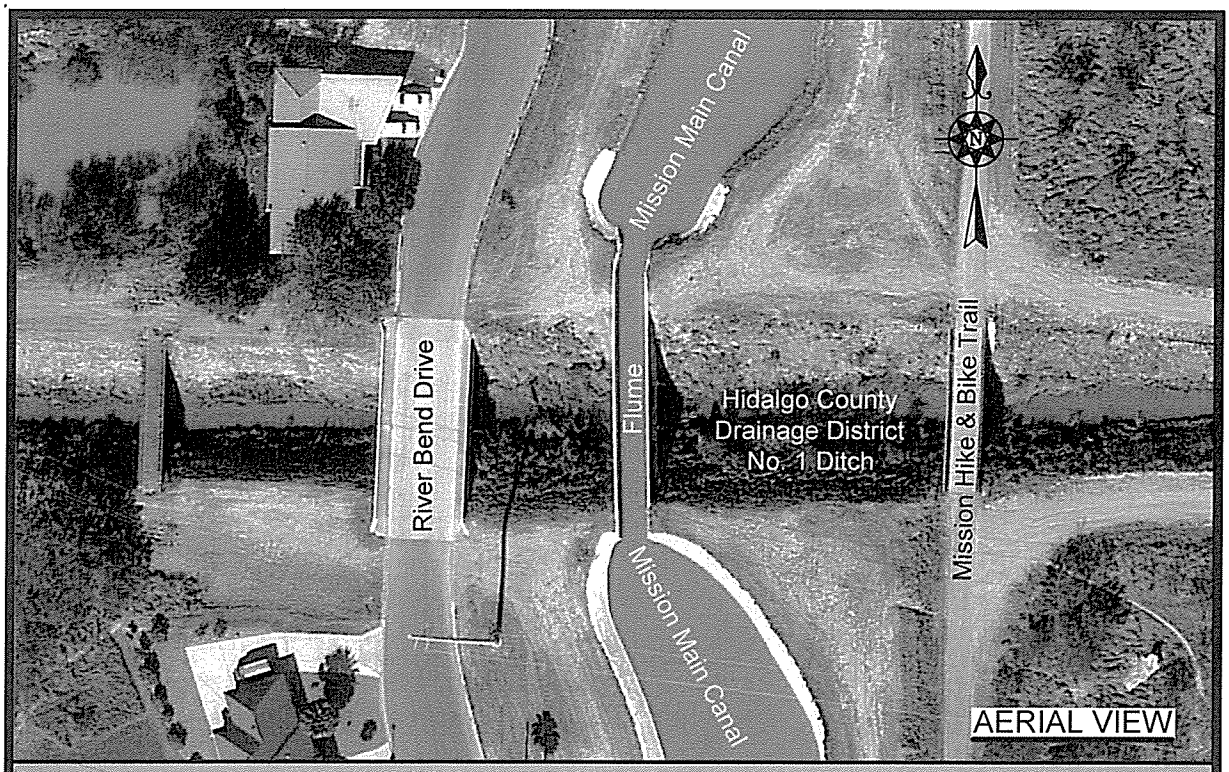
Appendix "B" includes a calculation of the volume of this section of canal. Assuming the structure fails every five years, then the total canal volume of 368 acre feet averaged over five years amounts to annual losses of 74 acre feet per year. Figure 4 is a photograph of the flume taken from the upstream paved transition section. The flume and transition are covered with a liner; however, the liner is failing, as seen in the photograph.

The original flume is a concrete open channel across a drainage ditch. This project will replace the flume by installing irrigation conduits over drainage culvert in fill placed across the ditch. The culverts will be 84" diameter to carry the drain ditch flow. Two 72" diameter pipelines will be laid across the new fill, connecting the canal across the ditch. Reconstruction of the canal transition sections are included. The proposed piping will be Duromaxx as manufactured by Contech Construction Products. Piping is a significant improvement over the existing elevated open channel flume. The proposed plan and profile is shown in Figure 5. This work will be completed in Year 2.

A third component of this project is lining of the suction lines at the First Lift Pump Station on the Rio Grande. The existing intakes are steel pipes. Figure 6 shows the original plans of the 60" intake lines. The lines are constructed of steel and the current condition is poor. Over the years the liners have been patched, and at some point were coated with a 100% polyurethane coating. However, this coating has failed. Several issues exist with the existing lines, the operators have difficulty priming the pumps and the suction lines draw in air resulting in reduced pump efficiencies. The intake lines will be lined with "Insituform" method which is a heat cured fiberglass liner. This method is typically used in deep sewer lines, and is a perfect fit for this project. The fiberglass has structural qualities and will be capable of functioning if the outer steel shell fails. The fiberglass lining will improve the friction coefficient over steel pipe, as well as reducing air intake into the suction lines and thereby increasing energy efficiency. Steel pipes deteriorate due to corrosion and abrasion from suspended sediments and as this occurs pumping, efficiency is lost. Fiberglass lining is resistant to corrosion and abrasion and is estimated to have a 50 year life. The friction coefficient for fiberglass lining will not increase with age.

Table 2
Canal Lining Summary

	BRYAN CANAL	MISSION MAIN 5 1/4 SOUTH	MISSION MAIN 5 1/4 NORTH	TOTAL
LENGTH (MILES)	1.10	1.94	1.48	4.52
ESTIMATED SEEPAGE RATE (ACRE-FEET PER YEAR)	1,000	350	1,400	2,750
ESTIMATED LINER EFFICIENCY	85%	85%	85%	85%
WATER SAVED (ACRE FEET PER YEAR)	850	298	1190	2338
RELINING COST	$317,881.18	$339,804.02	$438,456.80	$1,096,142.00
WATER LOSS (AC-FT/MILE YR)	770	153	805	517
RELINING COST ($/MILE)	$287,941.78	$175,297.04	$296,421.50	$242,423.97
RELINING COST PER AC-FT CONSERVED ($/AC-FT/YR)	**$373.98**	**$1,142.20**	**$368.45**	**$468.94**
REASONABLENESS OF COST FOR 50 YEAR LIFE FOR RELINING ONLY (COST PER ACRE-FOOT * YEAR)	$7.48	$22.84	$7.37	$9.38



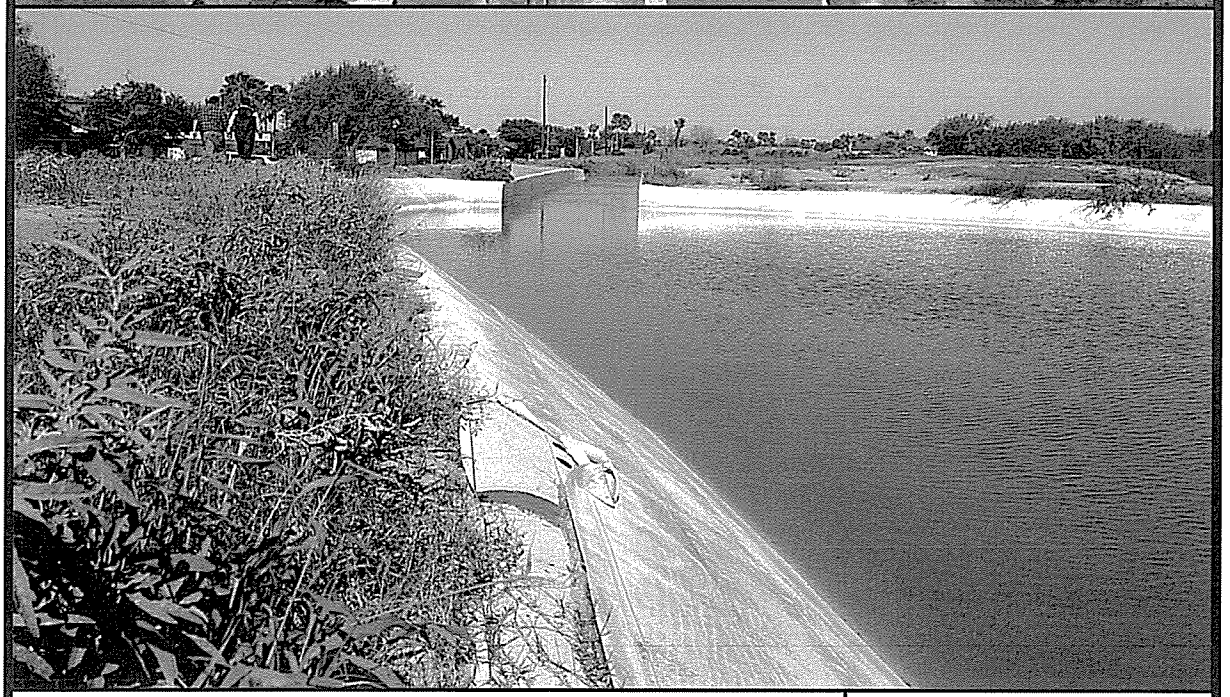


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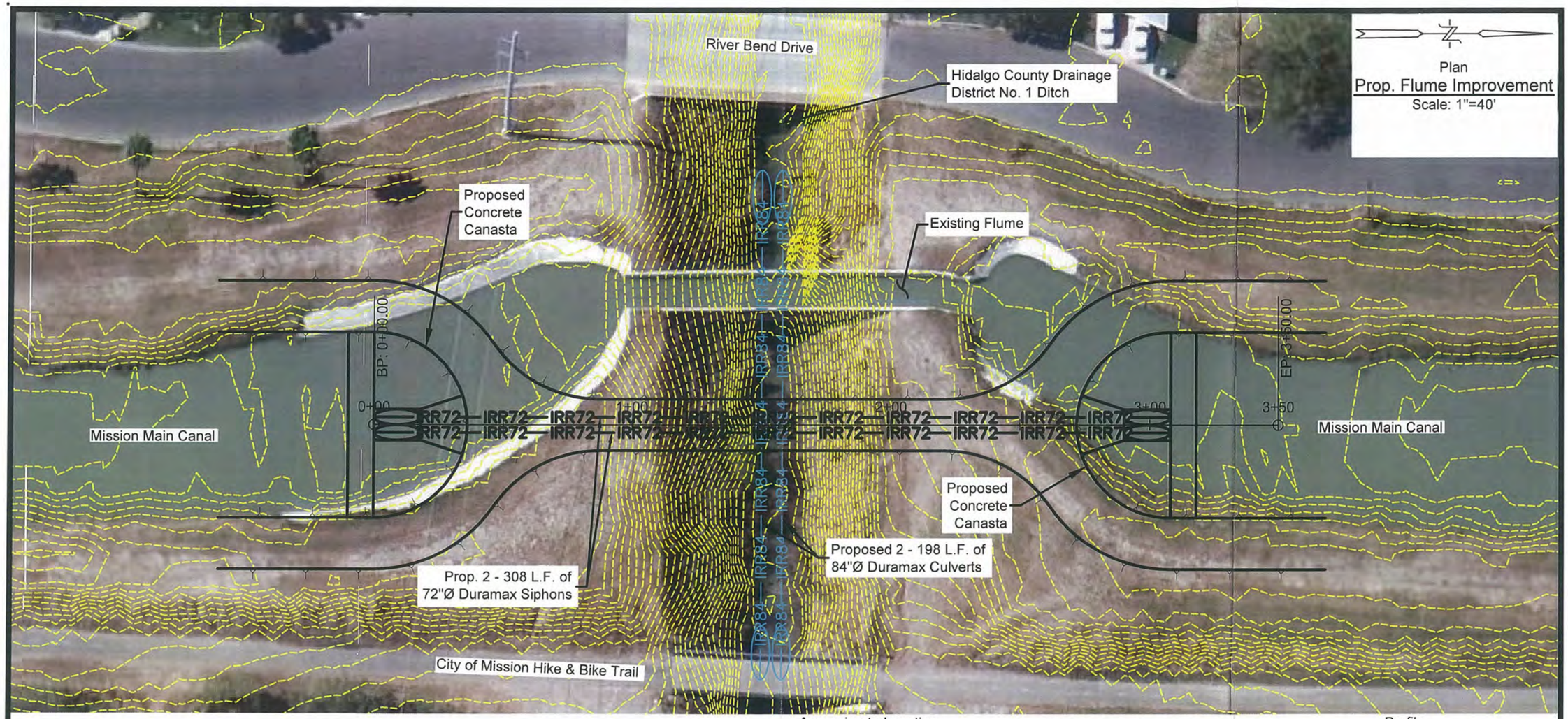
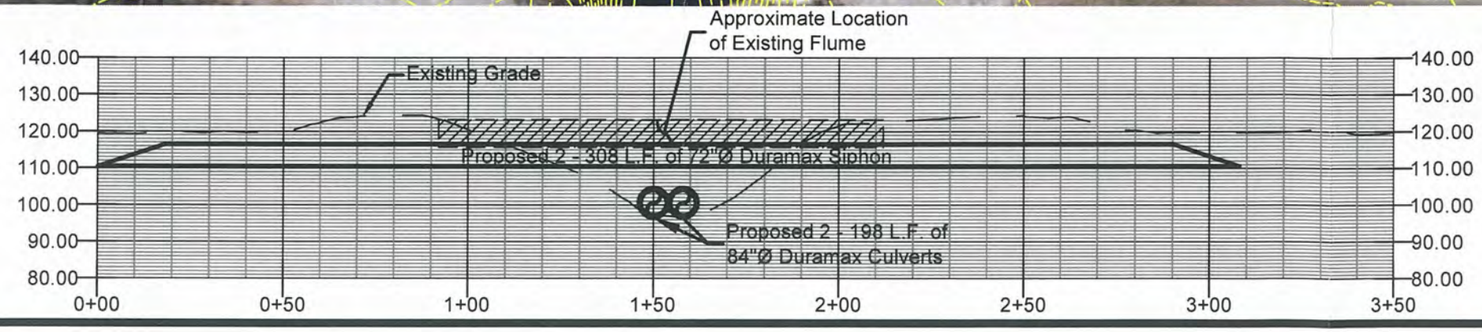
Figure 4
Mission Main Canal
Flume





Profile
Prop. Flume Replacement
Horizontal: 1"=40'
Vertical: 1"=40'

UID
Figure 5
Mission Main Canal
Flume Improvement

Table 3 provides a calculation of the estimated energy conservation by lining the intake lines. This is difficult to quantify because there is no way to stop the air leaking into the intake lines for a comparative analysis. It is this author's professional opinion that a minimum of 1% improvement in efficiency is reasonable. The power consumption before and after the improvements per acre foot pumped will be evaluated. This work will be completed in Year 1 of the project.

A fourth component of the project will be a windmill that mechanically powers a Second Lift Pump. The wind powered pump will perform useful work at the second lift pump station any time there is wind blowing thereby reducing the volume of water to be lifted by electric and gas powered pumps. The utilization of a windmill is a true renewable source of energy due to the fact that the wind powered pump converts wind energy directly into movement of water energy via the gear and piston mechanism connecting to the piston pump. This is a direct transfer of energy compared to the electric method that would require conversion, which reduces efficiencies. The basic problem with wind electric power for Irrigation Districts is that the wind and the water demand do not coincide. The proposed wind pump will be located where it will always provide useful work, even when demand is low. Appendix "C" contains information available online from the Ironman Windmill Co.

A 20 foot diameter fan on the windmill with a 14" pump is estimated to pump an average of 99 gallons per minute, or 160 acre feet per year. This flow rate is based on the manufacturer's data provided with an average wind speed in the area of 11 miles per hour and a lift of 35 feet. The 20 foot fan is large enough to capture 7,500 watts of wind energy at 20 miles per hour. Above 20 miles per hour, the windmill begins to turn out of the wind to limit potentially destructive forces. The wind pump will produce a peak flow of 180 gallons per minute at wind speeds of 20-30 miles per hour and less flow during lighter winds.

The Wind Powered Second Lift Pump will result in significant energy savings; amounting to 7,900 kilowatt hours per year. The calculation is included in Table 4. The energy required to drive the pump is the water horsepower divided by the wire to water efficiency. The wire to water efficiency is estimated to be 80% for an equivalent pump times 90% for an equivalent pump motor or 72%. In other words, the windmill pump replaces about 7,942 kilowatt hours of conventional electricity consumed by the District. The estimated savings is $794 annually.

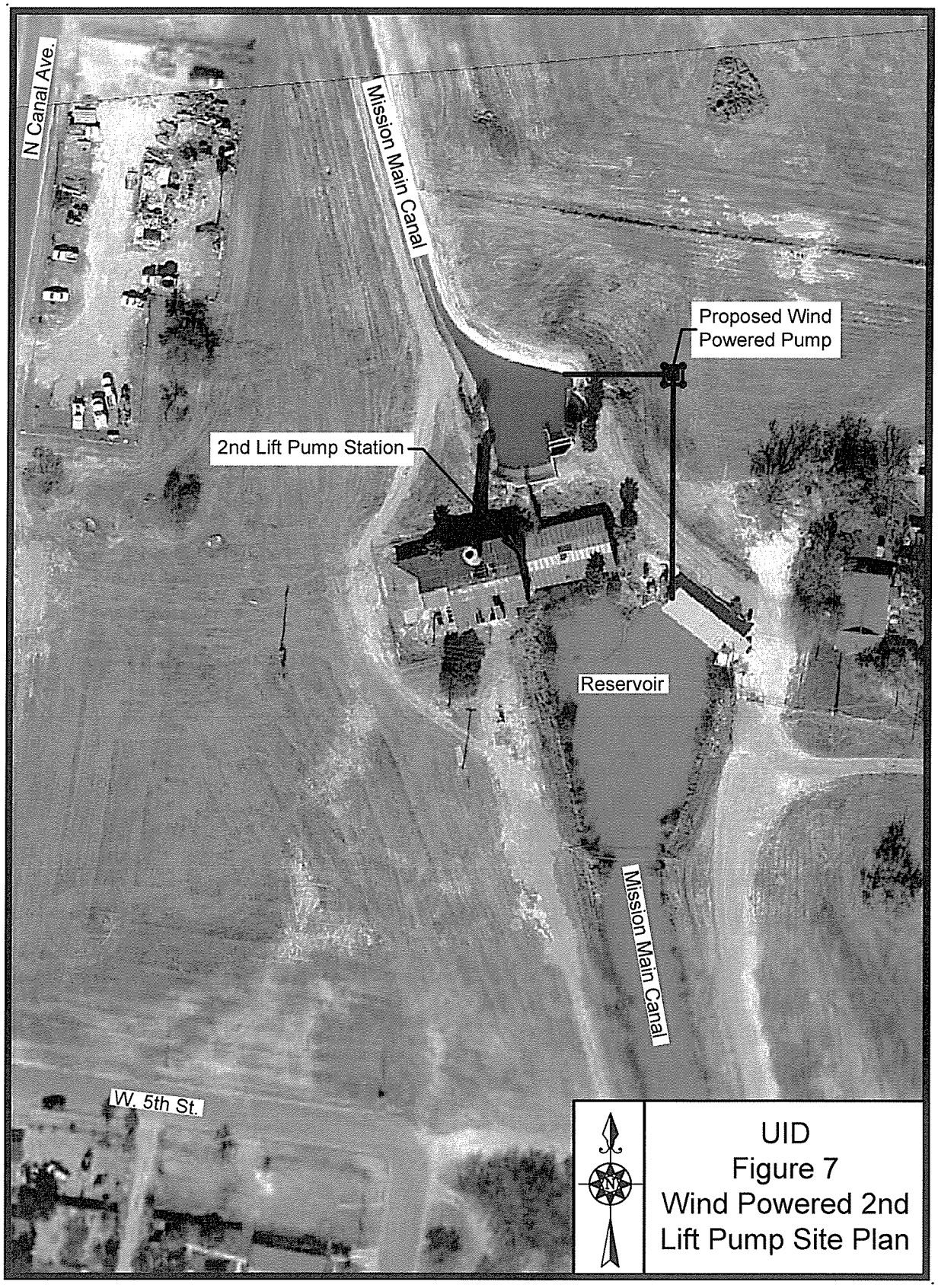
Figure 7 is a location map and site plan for the proposed pump. Figure 8 is a plan and profile of the proposed wind driven pump. The District will contract with a pier contractor to provide the four drilled piers for the tower foundation. The Iron Man Windmill Co. will provide and install the windmill pump. The proposed wind powered pump will be located at the District's Second Lift Pump Station. This location allows useful work anytime the wind is blowing. The result is that the existing gas and electric pumps will not need to run as often. The new wind powered pump is anticipated to pump about 160 acre feet per year. The District will install the suction and discharge lines. The proposed SCADA system will include a stroke counter on the wind pump to calculate flow. Each stroke is a known volume of water.

Table 3
Energy Conservation by Lining First Lift Suction Lines

Current Flow through First Lift Pumps	42,800	Acre Feet per Year
Less Conservation by this Project	-2,512	Acre Feet per Year
Projected Flow through First Lift Pumps	40,288	Acre Feet per Year
	24,975	gallons per minute
Lift at River Pumping Facility (First Lift)	25	feet
Energy required to pump annual flow through First Lift Pump Station	158	Hp
	118	Kilowatts
Increase in Overall Efficiency	1%	
Estimated Energy Savings by Lining Suction Lines	1.18	Kilowatts
Estimated Annual Energy Savings	**10,304**	**kilowatt hours**
Estimated Average District Energy Rate including Transmission for Natural Gas and Electric	$0.10	per kilowatt hour
	$1,030	**annual savings**

Table 4
Wind Powered Second Lift Pump Calculations

Average Wind Speed	11	miles per hour
Lift	35	feet
Ironman Windmill Pumping Rate for 20 foot fan and 14" pump	99	gallons per minute
Energy Required to Lift Water at stated lift and rate	0.88	Horsepower
	0.65	kilowatts
Equivalent Water Pump Estimated Efficiency	80%	
Equivalent Water Pump Electric Motor Efficiency	90%	
Equivalent Electric Driven Pump Wire to Water Efficiency	72%	
Equivalent Electric Pump Energy Consumption	1.22	Horsepower
	0.91	kilowatts
Estimated Annual Energy Savings	7,942	kilowatt hours
District Energy Rate including Transmission	$0.10	per kilowatt hour
	$794	annual savings
Estimated Annual Water Pumped by the Wind Powered Pump	160	Acre Feet


N Canal Ave.
Mission Main Canal
Proposed Wind Powered Pump
2nd Lift Pump Station
Reservoir
Mission Main Canal
W. 5th St.
N
UID
Figure 7
Wind Powered 2nd Lift Pump Site Plan

A fifth component of the proposed project is inclusive of Solar Powered SCADA remote terminal units at the Second Lift Pump Station and the Third Lift Pump Station and a conventional powered SCADA unit at the Bryan Canal Radial Gate. The District currently has an ongoing SCADA project that includes the First Lift Pump Station. The purpose of the SCADA system is to better manage the District's water resources by monitoring flow and controlling the Bryan Canal Radial Gate remotely. Currently, the District does not have flow monitoring of the Second and Third Lift Pump Stations. There is an existing radial gate that controls flow to the Bryan Canal, but it is not monitored or controlled. The Bryan Canal is wide and has very little slope, making it difficult to control. The District loses water at the downstream end of the Bryan Canal because there is no upstream control. Implementation of the remote operation and monitoring of the Bryan Canal Radial Gate will conserve approximately 100 acre feet of water per year.

The SCADA components to be added to the existing system are as follows:

- Second Lift Pump Station
  - Pump No. 1 Flow Rate and Speed
  - Pump No. 2 Flow Rate
  - Pump No. 3 Flow Rate
  - Pump No. 4 Flow Rate and Speed
  - Pump Well Level
  - Discharge Canal Level
  - Wind Speed and Direction
  - Windmill Stroke Count
  - Windmill Flow
  - Total Station Flow

- Third Lift Pump Station
  - Pump No. 1 Status
  - Pump No. 2 Status and Speed
  - Pump No. 3 Status and Speed
  - Pump No. 4 Status
  - Pump Well Level
  - Discharge Well Level
  - Station Total Flow

- Bryan Canal Radial Gate
  - Bryan Canal Flow
  - Radial Gate Percent Open
  - Bryan Canal Level

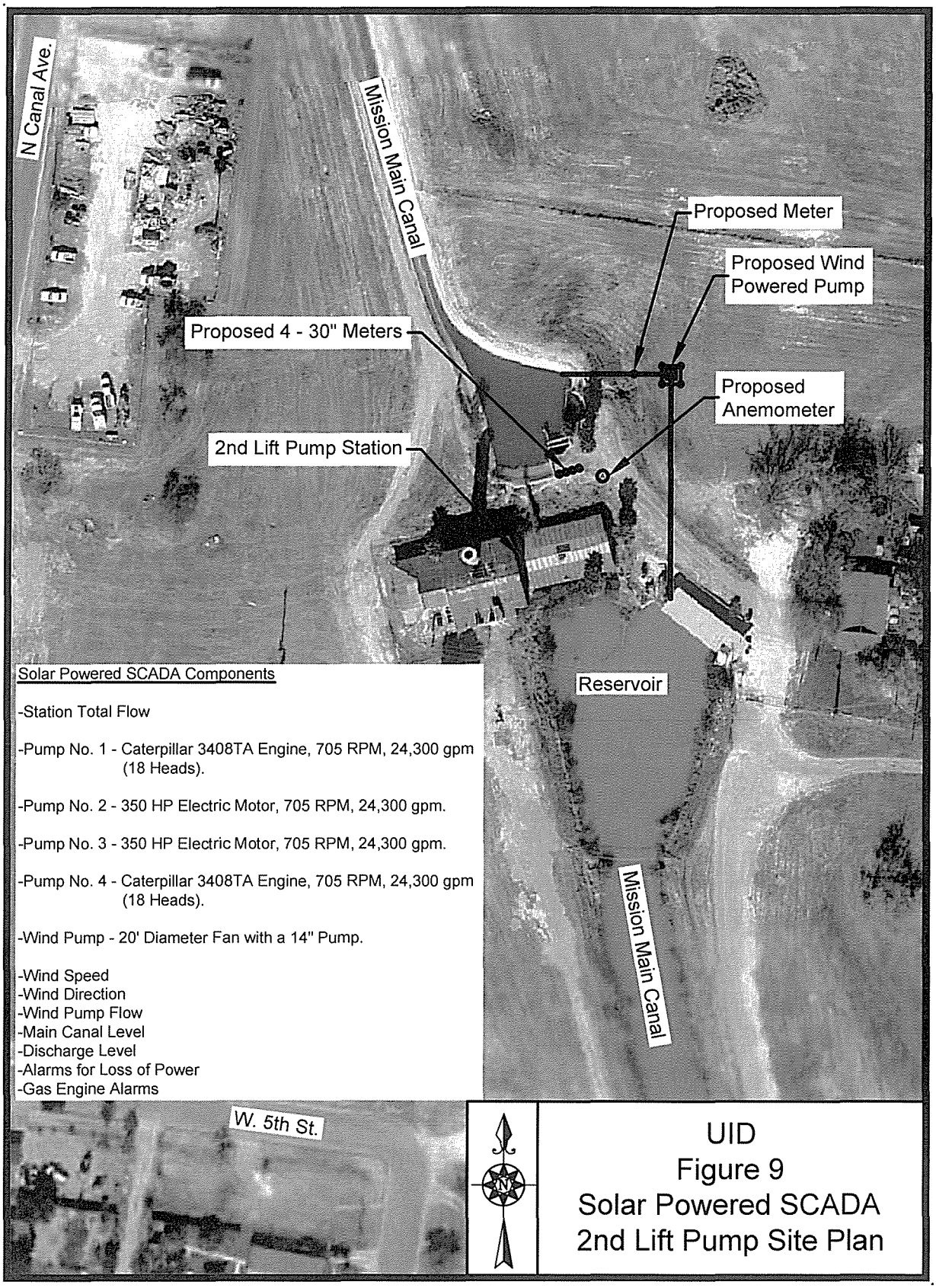
Each remote site will tie into the office and will be monitored at the Central Terminal Unit. Canal Riders will be able to access the SCADA system via an internet connection. It is anticipated that a significant amount of energy will be conserved by a reduction in canal rider mileage. Currently, the District's four Canal Riders log an estimated 120,000 miles per year in their vehicles. With the introduction of the SCADA system, the Canal Rider mileage will be reduced by approximately 10% or 12,000 miles per year. Considering the Federal Mileage Rate of $0.565 per mile, implementing the proposed SCADA components will save the district approximately $6,780.00 per year. In addition, at 15 miles per gallon, the District fuel consumption will be reduced by 800 gallons of gasoline.

Each Solar Powered Remote Terminal Unit will replace approximately 100 watts of continuous power. For the Second Lift and Third Lift Pump Stations, this equates to 100 watts x 24 hours per day, 365 days per year, for two units or 1,752 kilowatt hours per year. The Solar Powered Units are preferred because they are isolated from the electric grid that often includes power spiking and strong currents that can interfere with the instrumentation and damage equipment. In addition, the Solar Powered units will charge a DC battery that will function during power outages. The District needs to monitor during power outages because each station has natural gas pumping units and can operate without electric power.

Figure 9 is a site plan for the Second Lift Pump Station. An anemometer will be installed to monitor wind velocity to rate the wind pump performance. Windmill flow will be calculated from a stroke count on the windmill. Four 30" meters will be installed on the four individual 30" discharge lines. Status will be monitored for each pump to determine which pump is running. A tachometer will be provided on each gas driven pump to monitor engine speeds. Pump flow will vary the engine speed.

Figure 10 provides a site plan for the Solar Powered SCADA system at the Third Lift Pump Station. A single 60" flow meter will be installed as the individual discharge lines are too short to meter. Status will be monitored for each pump to determine which pump is running. A tachometer will be provided on each gas driven pump to monitor engine speeds. Pump flow will vary the engine speed.

Figure 11 provides the site plan for the Bryan Canal Radial Gate. This particular unit will not include solar power as it is hardwired to the office power source to drive the modulating radial gate.


N Canal Ave.
Mission Main Canal
Proposed Meter
Proposed Wind Powered Pump
Proposed 4 - 30" Meters
Proposed Anemometer
2nd Lift Pump Station
Reservoir
Mission Main Canal
W. 5th St.
Solar Powered SCADA Components
-Station Total Flow
-Pump No. 1 - Caterpillar 3408TA Engine, 705 RPM, 24,300 gpm (18 Heads).
-Pump No. 2 - 350 HP Electric Motor, 705 RPM, 24,300 gpm.
-Pump No. 3 - 350 HP Electric Motor, 705 RPM, 24,300 gpm.
-Pump No. 4 - Caterpillar 3408TA Engine, 705 RPM, 24,300 gpm (18 Heads).
-Wind Pump - 20' Diameter Fan with a 14" Pump.
-Wind Speed
-Wind Direction
-Wind Pump Flow
-Main Canal Level
-Discharge Level
-Alarms for Loss of Power
-Gas Engine Alarms
UID
Figure 9
Solar Powered SCADA
2nd Lift Pump Site Plan


3rd Lift
Pump Station
Proposed Flow Meter
Main Canal
Solar Powered SCADA Components
-Station Total Flow
-Pump No. 1 - Balch Machine Cascade 30 MF, Electric 350 HP 705 RPM 24,300 gpm (18 Heads).
-Pump No. 2 - CAT 3406 Engine 2.24 Gear Reducer FM 24-8312, 18,000 gpm (13 Heads)
-Pump No. 3 - CAT 3306 Engine 2.24 Gear Reducer Cascade 20 MF 13,500 gpm (10 Heads)
-Pump No. 4 - 150 HP 880 RPM Cascade 20 MF 13,500 gpm (10 Heads)
-Main Canal Level
-Discharge Level
-Alarms for Loss of Power
-Gas Enginge Alarms
N
UID
Figure 10
Solar Powered SCADA
3rd Lift Pump Site Plan


3rd Lift
Pump Station
Main Canal
United Irrigation
District Office
W Mile 2 Rd
Radial Gate
Proposed Flow Meter
& Level Sensor
Bryan Canal
Main Canal
From
Second
Lift
N
UID
Figure 11
Bryan Canal Radial Gate

A sixth component of the project is construction of an outlet and pipeline to provide water to the Pate Bend 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 "D". 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 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.

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 United Irrigation District, 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.

The District will provide labor and equipment to construct 275 linear feet of 18" pipeline from an existing line to fill a Resaca on the refuge. District representatives met with refuge personnel to determine their water management needs and developed this component of the project. The project includes a meter to be furnished and installed by the District. The location of the Refuge Outlet is shown in Figure 12.

A seventh component of the project is water marketing. United Irrigation District will convert 1,000 acre feet of agricultural irrigation water rights to municipal water rights and sell them to a municipal provider. The conversion rate for converting irrigation rights to municipal is 2:1 which will result in 500 acre feet of municipal rights. The current market rate of municipal rights as established by the Lower Rio Grande Regional Water Authority is $2,279 per acre foot. This will yield approximately $1,139,500 for the District to fund their share of the project. The marketing is scheduled to occur in the first year of the project.

Water Rights in the lower Rio Grande are well managed by the Texas Commission on Environmental Quality (TCEQ) through the Watermaster Operations. There is a conversion process to convert agricultural rights to municipal rights. The Class "A" Agricultural rights are discounted 50% when converted to municipal rights and guaranteed on an annual basis while the agricultural rights are allocated as storage increases in Falcon and Amistad Reservoirs. Furthermore, in 2007, the Texas Legislature passed a statute with conversion of agricultural rights to municipal use and the terms of the conversion transaction. This only applies to new subdivisions filed after 2007 and makes the water rights available to the future water provider of the urbanized land at 68% discount if they request to purchase the rights within two years. South Texas has an extremely active water market. The water rights proposed for marketing, as part of this project, do not include any that may fall under the above mentioned law.

(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 Canal Relining and Main Flume Improvement Project is projected to be 2,512 Acre Feet per year. Seepage in the main canal was determined by a ponding test that resulted in an average loss of 517 acre feet of loss per mile per year. The project is proposing to line 4.52 miles of the existing canal with the fibermesh concrete liner, which has proven effective in reducing cracking and seepage over concrete lining. The Main Flume improvement project is improvement of an open channel flume crossing of a drainage ditch to a double barrel conduit of Duromaxx polyurethane pipe crossing a culvert through an embankment across the drainage ditch. The closed conduit will not be susceptible to evaporation losses and chances of failure will virtually be eliminated. The water loss savings are derived from the flume not failing. The Bryan Canal automatic radial gate will result in an estimated 100 acre feet per year of water loss that flows out of the Bryan Canal. Appendix A and the description in the previous section provide detailed calculations of the savings as a result of the canal relining and Main Flume Improvement. The 100 acre feet saved in the Bryan Canal is based on the Canal Rider's estimate. The seepage loss reduction will be verified by re-performing the test once the new liner is in service.

The District's average annual water pumped from the Rio Grande over the past five years is 42,800 acre feet. The water to be saved by canal relining is lost to seepage into the ground. The conserved water that is not marketed will remain in the Lower Rio Grande Valley Water Master System. These waters are stored in Falcon Lake and Amistad Lake above the Falcon and Amistad Dams.

Subcriterion No. A.2 - Percentage of Total Supply:
Table 5 indicates that the water saved expressed as a percentage of total supply is 5.9%. The District's total losses are estimated to be about 17% based on the 15 year average as reflected in Table 1. Therefore, the WaterSMART Grant Project is projected to reduce total losses from 17% to 11%.

Table 5 –Quantifiable Water Savings

Savings as a result of Replacing Canal Lining	2,338 Ac Ft/Yr
Savings as a result of Main Flume Improvement	74 Ac Ft/Yr
Savings as a result of the Bryan Canal Automatic Radial Gate	100 Ac Ft/Yr
Total water saving for this project	2,512 Ac Ft/Yr
Savings expressed as a percent of total supply of 42,800 acre feet	5.9%

Subcriterion No. A.1(b) – Improved Water Management:
Implementation of the SCADA monitoring at the Second Lift, Third Lift and the Bryan Canal Radial Gate will result in better water management. Currently, the District estimates flow rates based on known pump capacities with visual verification. The canal levels are also visually verified. The SCADA will assist the District to respond more promptly to operational issues that may arise. The monitoring will certainly result in better water management. The Bryan Canal overflows occasionally as it is difficult to manage with manual gates and changing conditions. The automation of the Bryan Canal Radial Gates will certainly result in better managed water.

Approximately 85% of the Districts water is pumped through the Second Lift Pump Station and the Third Lift Pump Station. The Third Lift and the Bryan Canal are both downstream of the Second Lift, therefore, the estimated account of better managed water is:

$$\frac{\text{Better Managed Water}}{\text{Average Annual Rate Supply}} = \frac{\text{36,380 Ac Feet}}{\text{42,800 Ac Feet}} = 85\%$$

Subcriterion No. A.3 - Reasonableness of Cost:
Table 6 provides the Reasonableness of Cost Analysis required by the Bureau. Based on a design life of 50 years and an annual savings of 2,512 acre feet, the Reasonableness of Cost is $22.13 per acre foot *year. We have taken this analysis one step further for the District's consideration to include a consideration of the power cost savings. The total anticipated power cost savings of $37,843 per year is converted to a capital value at 4% for a term of 50 years resulting in a present value for the savings of $812,951.13 as shown in Table 6. This reduces the Reasonableness of Cost to $15.65 per acre foot conserved.

Evaluation Criterion B: Energy-Water Nexus

Subcriterion No. B.1 – Implementing Renewable Energy Projects Related to Water Management and Delivery:
The District will implement a renewable energy project utilizing wind energy to provide a wind powered pump at the existing Second Lift Station. The wind powered pump will lift water from a lower canal to a higher canal. The water is currently lifted by electric pumps and natural gas powered propeller pumps. The windmill will pump 160 acre feet per year at 50 KwH per acre foot. As identified in Table 4 and supported by Appendix C, the wind powered pump will replace an average equivalent energy of 7,942 kilowatt hours per year that would have to be purchased from conventional energy companies. The beneficiaries are the customers since energy savings will be passed on to water users. This project's wind powered pump does not consume any water while it is working. The two Solar Powered SCADA units will consume an average of 100 watts of power each. The primary purpose of the solar powered units is to isolate sensitive instrumentation from interference and harmful spikes in the electric grid, but the two units will generate about 1,752 kilowatts of power per year which would otherwise have to be generated by conventional power.

Table 6
Reasonableness of Costs

WaterSMART Calculation of Reasonableness of Costs	$22.13	per Acre-Ft*year
Total Project Cost	$2,778,962	
Total Water Conserved	2,512	Acre Feet
Improvement Life	50	Years
Capitalized Value of Power Cost Savings		
Total Annual Power Cost Savings	$37,843	per Year
Total Annual Energy Savings	310,630	KWH
Term	50	Years
Interest Rate Assumed for Calculation	4%	
Net Present Value of Power Cost Savings	$812,951.13	
District's Consideration of Reasonableness of Costs including Reductions in Power Costs	$15.65	per Acre-Ft*year
Total Project Cost less Capitalized Cost of Operation Savings	$1,966,011	
Total Water Conserved	2,512	Acre Feet
Improvement Life	50	Years

Subcriterion No. B.2 – Increasing Energy Efficiency in Water Management:
Water conserved by lining the canal and improving the flume will result in energy savings as a result of not having to pump the conserved water. Table 7 provides a calculation of the energy savings. The energy savings are a direct result of not having to pump water that is lost through seepage of the relined canals, lost in a Flume failure and saved by automating the Bryan Canal Radial Gates. Energy through pumps is a function of lift. Of all the conserved water, 2,512 acre feet is pumped through the First Lift which has a lift of 25 feet and an estimated wire to water efficiency of 72%. The conservation results in an energy savings of 89,230 kilowatts at the First Lift. All of the conservation, except for the flume, flows through the second lift that has a hydraulic lift of 38 feet. Not pumping conserved water through the second lift will save 131,634 kilowatt hours per year. Finally, only the conserved water from relining the Mission Main Canal is pumped through the Third Lift. Not pumping the conserved 1,488 acre feet through the Third Lift will save 69,770 kilowatt hours per year.

The District has dual energy consisting of both natural gas and electricity. An analysis performed in 2011 revealed that electric cost was about $0.14 per kilowatt hour, while natural gas was a little less than half the cost. However, both are quite variable, so for this analysis, an average of $0.10 per kilowatt hour is assumed. The energy saved as a result of water conservation will be approximately 290,633 kilowatt hours per year for an annual cost saving of $29,063. Some power cost data is presented in Appendix "F".

The lining of the suction lines at the First Lift Station will result in approximately a 1% increase in overall pumping efficiency. Table 7 (second page) provides a methodology for this calculation. If one considers the average District diversions of 42,800 acre feet and calculates 1% of the energy requirements, the result is that the District will save an additional 10,304 kilowatt hours per year by lining the suction lines with fiberglass.

The total energy conserved for WaterSMART project is 310,630 kilowatt hours per year, including the wind powered pump and the solar powered SCADA system. This will save the District $30,971 at $0.10 per kilowatt hour. The size of the pumps is not relative except that the hydraulic efficiency of 80% is only possible in large pumps such as those used by the District. The lift, however, is critical and identified in the previous calculations. Water treatment is not a factor in this project.

The project results in overall pumping requirement reduced by approximately 6%. The District has more than adequate pumping capacity and the project increases reliability by reducing demand. The First Lift has three 58,300 gpm horizontal centrifugal pumps. The Second Lift has four 24,300 gpm propeller pumps. The Third Lift has four propeller pumps including (2) 13,500 gpm pumps, (1) 18,000 gpm pump and a 24,300 gpm pump. The SCADA system will result in an estimated savings of 12,000 miles per year in miles driven by the Canal Riders. This is an estimated 10% of 120,000 total miles driven annually by the four canal riders.

Table 7
Energy Conservation Calculations

Annual Water Conservation through the First Lift Pumps		
Conservation from Flume Improvement	74	Acre Feet per Year
Conservation Relining the Bryan Canal	850	Acre Feet per Year
Conservation Relining the Mission Main	1,488	Acre Feet per Year
Conservation Automating Bryan Radial Gate	100	Acre Feet per Year
Total Conservation through First Lift Pumps	**2,512**	**Acre Feet per Year**
Lift at River Pumping Facility (First Lift)	25	feet
Annual Water Conserved Expressed in Gallons per minute	1,557	gallons per minute
Energy Required to Lift Water at stated lift and rate	9.83	Horsepower
	7.33	kilowatts
Water Pump Estimated Efficiency	80%	
Water Pump Electric Motor Efficiency	90%	
Wire to Water Efficiency	72%	
Equivalent Electric Pump Energy Consumption	13.65	Horsepower
	10.19	kilowatts
Estimated Annual Energy Savings	**89,230**	**kilowatt hours**
Estimated Average District Energy Rate including Transmission for Natural Gas and Electric	$0.10	per kilowatt hour
	$8,923	**annual savings**
Energy Cost of Pumping water through First Lift expressed per acre foot pumped	$3.55	per acre foot
Annual Water Conservation through the Second Lift Pumps		
Conservation Relining the Bryan Canal	850	Acre Feet per Year
Conservation Relining the Mission Main	1,488	Acre Feet per Year
Conservation Automating Bryan Radial Gate	100	Acre Feet per Year
Total Conservation through Second Lift Pumps	**2,438**	**Acre Feet per Year**
Lift at Second Lift	38	feet
Annual Water Conserved Expressed in Gallons per minute	1,511	gallons per minute
Energy Required to Lift Water at stated lift and rate	14.50	Horsepower
	10.82	kilowatts
Water Pump Estimated Efficiency	80%	
Water Pump Electric Motor Efficiency	90%	
Wire to Water Efficiency	72%	
Equivalent Electric Pump Energy Consumption	20.14	Horsepower
	15.03	kilowatts
Estimated Annual Energy Savings	**131,634**	**kilowatt hours**
Estimated Average District Energy Rate including Transmission for Natural Gas and Electric	$0.10	per kilowatt hour
	$13,163	**annual savings**
Energy Cost of Pumping water through Second Lift expressed per acre foot pumped	$5.40	per acre foot

Table 7 (Continued)

Annual Water Conservation through the Third Lift Pumps		
Conservation Relining the Mission Main	1,488	Acre Feet per Year
Total Conservation through Third Lift Pumps	**1,488**	**Acre Feet per Year**
Lift at Third Lift Pumps	33	feet
Annual Water Conserved Expressed in Gallons per minute	922	gallons per minute
Energy Required to Lift Water at stated lift and rate	7.69	Horsepower
	5.73	kilowatts
Water Pump Estimated Efficiency	80%	
Water Pump Electric Motor Efficiency	90%	
Wire to Water Efficiency	72%	
Equivalent Electric Pump Energy Consumption	10.68	Horsepower
	7.96	kilowatts
Estimated Annual Energy Savings	**69,770**	**kilowatt hours**
Estimated Average District Energy Rate including Transmission for Natural Gas and Electric	$0.10	per kilowatt hour
	$6,977	**annual savings**
Energy Cost of Pumping water through First Lift expressed per acre foot pumped	$4.69	per acre foot
Energy Conservation through the First Lift Pumps resulting from Lining Suction Lines		
Annual Flow through First Lift Pumps	42,800	Acre Feet per Year
Less Cosnservation by this Project	-2,512	Acre Feet per Year
Post Project Flow through First Lift Pumps	**40,288**	**Acre Feet per Year**
Lift at River Pumping Facility (First Lift)	25	feet
Annual Water Conserved Expressed in Gallons per minute	24,975	gallons per minute
Energy Required to Lift Water at stated lift and rate	157.67	Horsepower
	117.62	kilowatts
Increase in Overall Efficiency Efficiency	1%	
Estimated Annual Energy Savings	**10,304**	**kilowatt hours**
Estimated Average District Energy Rate including Transmission for Natural Gas and Electric	$0.10	per kilowatt hour
	$1,030	**annual savings**
Energy Replaced by the Proposed Wind Powered Second Lift Pump (Table 4)	**7,942**	**kilowatt hours**
	$794	**annual savings**
Energy Replaced by the Solar Powered SCADA Units	**1,752**	**kilowatt hours**
	$175	**annual savings**
Reduction in Canal Rider Total Annual Mileage	**12,000**	**Miles**
Annual Canal Rider Vehicle Cost Savings at Federal Reimbursement Rate of $0.565 per mile	**$6,780**	**annual savings**
Annual Gasoline Consumption Reduction by Reduced Canal rider Mileage at 15 miles per gallon	**800**	**gallons of gasoline**
Total Energy Savings by not pumping Conserved Water	***290,633***	***kilowatt hours***
Total Conventional Energy Savings through Water and Energy Conservation and Renewable Energy	***310,630***	***kilowatt hours***
Total Cost Savings through Energy Savings	***$37,843***	***annual savings***

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, Pate Bend, is adjacent to Bentsen State Park. The relationship of the supply to the endangered species is that the refuge is adjacent to United Irrigation District and the Rio Grande. Appendix "D" provides information on the refuge system and a link to the Recovery Plan for the Ocelot. 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 water 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 will convert and market 1,000 acre feet of agricultural rights to result in 500 acre feet of municipal rights which will be marketed permanently to municipal suppliers. United Irrigation District currently pumps water for the City of Mission, Sharyland Water Supply Corporation, and the City of McAllen. The Lower Rio Grande Watermaster System differentiates between agricultural and municipal rights. Municipal rights are allocated to 100 percent at the beginning of each year while the Agricultural rights are distributed on a pro-rata basis any time climactic conditions result in new storage in the Falcon and Amistad system. The TCEQ allows conversion from Agricultural to Municipal rights at a 50% reduction factor because of the guarantee associated with the Municipal right. When United Irrigation District speaks of its municipal customers, it refers to water that has been permanently converted to municipal use for that particular customer. The municipal customers each own the rights or permanently lease their rights under a perpetual contract.

The water marketing proposed herein is to permanently convert agricultural water rights that are not yet converted to a municipal use that does not yet exist. The end result may be to sell the converted rights to an existing municipal customer, but his would be over and above any existing agreements and should be classified as a "new" market for the full 12 points as outlined in the FOA. The Region M Planning Group more or less constitutes the available market potential for the marketed water. Currently, the water market includes a population that needs potable water. Any one of the Basin's water supply customers can purchase the converted rights and utilize them in their system. The Lower Rio Grande is an extremely active water market and sale of the rights will be easy, especially with the current drought conditions. One legal issue relating to the water market is the conversion of the water rights via the TCEQ process. In addition, the District will need to define the rights as surplus and advertise the sale according to the Texas Water Code.

The duration of the water market is perpetual. Once the rights are converted and sold, they will remain the property of the buyer in perpetuity.

Evaluation Criterion E: Other Contributions to Water Supply Sustainability

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[1] that require its contribution of inflows in to the Rio Grande. A large portion of the water which flows into the Falcon and Amistad Reservoirs (managed by the International Boundary 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.

A 2009 GAO Study[2] 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.

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/waterplan.php), by 2060, 35.2 percent of demand will be unmet.

[1] 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

[2] United States Government Accountability Office, Rural Water Infrastructure, Report to the Chairman, Committee on Agriculture, House of Representatives, 2009.

Texas is currently experiencing a moderate to severe drought. The January 1, 2013 drought monitor shows the region in an extreme to exceptional drought. 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.[3] Other reports have estimated the annual regional impact of agricultural water shortages costs the local economy $135 million and 4,130 jobs.[4] 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.

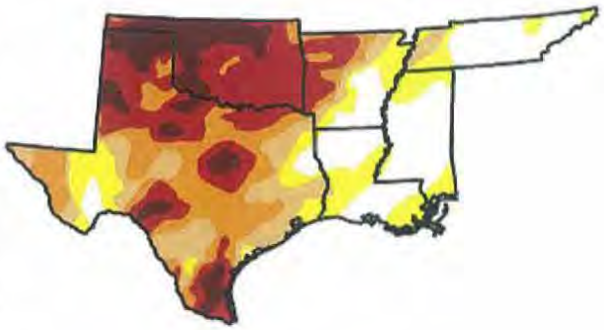
U.S. Drought Monitor

January 1, 2013
Valid 7 a.m. EST

South

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	21.18	78.82	63.69	50.50	32.80	10.98
Last Week (12/25/2012 map)	19.12	80.88	65.56	49.91	32.52	10.14
3 Months Ago (10/02/2012 map)	28.17	71.83	60.13	38.85	23.18	6.27
Start of Calendar Year (01/01/2013 map)	21.18	78.82	63.69	50.50	32.80	10.98
Start of Water Year (09/25/2012 map)	24.13	75.87	66.61	51.50	29.86	9.11
One Year Ago (12/27/2011 map)	26.47	73.53	69.01	54.81	39.11	17.15



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, January 3, 2013
Richard Heim, National Climatic Data Center, NOAA

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 distributed to other users. In addition, conserved water results in power conservation. For example, 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 Sharyland Water Supply Corporation, citizens of McAllen, citizens of Mission, businesses and all wholesale customers of the municipal suppliers.

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[3] Santa Ana, R., "Drought losses top $19 million in Lower Rio Grande Valley" AgriLife NEWS, Texas A&M University. November 13, 2009
[4] J. R. C. Robinson et al. / Water Policy 12 (2010) 114–128 Mitigating water shortages in a multiple risk environment

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 project will increase awareness of energy conservation because the wind powered Second Lift Pump will be large and highly visible. The fan diameter is 20 feet with an overall height near eighty feet. It is sure to be a subject of community discussion. The project integrates water and energy components via the wind powered booster pump.

Evaluation Criterion F: Implementation and Results

Subcriterion No. F. 1 – Project Planning:
The District's Water Conservation Plan is included as Appendix "E". The District is completing their Bureau funded LRGV project which is also devoted to water and 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," that 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 water 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 60 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 canal lining and the Refuge Outlet immediately.
The construction schedule will only be limited by irrigation demands. The wind powered pump will be ordered once plans are completed. Delivery time is typically 90 days. Water Marketing will begin once the grant is executed.

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:

Project Schedule

Quarter	
01/01/13 –03/31/13	Grant Application considered.
04/01/13 – 06/30/13	Grant Agreement executed.
Year 1	
07/01/13 – 09/30/13	Geotech for windmill initiated. Surveying completed. Construction plans completed. First Lift suction lines bid. Canal lining materials bid. Water marketing initiated. SCADA components ordered.
10/01/13 – 12/31/13	First lift suction lines contracted and scheduled. Wind pump foundation completed. MMS Canal lining 33% complete. Refuge Outlet completed. Meter vaults installed.
01/01/14 – 03/31/14	Wind pump erected & operational Water Marketing status update. First Lift suction lines completed. MMS Canal lining 67% complete. SCADA installation complete.
04/12/14 – 06/30/14	90 days of Wind Pump flow documented. MMS Canal lining 100% completed. SCADA troubleshooting and programming completed.
Year 2	
07/01/14 – 06/30/15	MMN Canal lining completed. Main Flume improved.
Year 3	
07/01/15 – 06/30/16	Bryan Canal lining completed.

Subcriterion No. F. 3 – Performance Measures
A new seepage test will be conducted on each section of canal with new liner. They will be tested upon completion to verify there is no measureable leakage. The wind powered pump will include a meter to quantify actual water produced which translates into energy saved. The District will compare energy consumption at First Lift one year after the suction lines have been replaced to document efficiency improvement. The Flume replacement will be inspected for any signs of leakage. The Canal Rider that operates Bryan Canal will be interviewed to determine the frequency and estimated quantity of canal overflow to verify that the Radial Gate is reducing canal overflow. Finally, the water marketing will be documented once the sale has been completed.

Evaluation Criterion G: Additional Non-Federal Funding
The District will fund 52% of the total project cost.

$$\frac{\text{Non-Federal Funding}}{\text{Total Project Cost}} = \frac{\$1,445,060.16}{\$2,778,961.85} = 52\%$$

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 District has a great relationship with the Bureau of Reclamation and has successfully completed about 1/3 of the LRGV project significantly under budget.

The Bureau of Reclamation is currently conducting a Basin Study (FY2011) 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 are conducting a Basin Study (Study) to evaluate 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 United Irrigation District is a member of the RGRWA

(5) Environmental Compliance

a) The project will briefly result in dust from the flume construction and canal lining activities. 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 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 "D"). This work will be subject to approval and coordination with refuge personnel.

c) There are no jurisdictional wetlands to be impacted by the project. The District pumps Rio Grande water in accordance with the laws of the state and will prepare and follow Texas Commission on Environmental Quality rules for storm water from a construction activity. (SWP3).

d) All the District's current facilities were constructed in the 1950s or later.

e) There will be no modification to existing features.

f) There are no Historical Markers affected by this project. The old Second Lift Pump Station is a historical site, but work will be limited to the facilities away from the old station.

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

There will be an approval required from the Hidalgo County Drainage District No. 1 for the Flume Improvement. Approval will be requested in Year 1 so that construction may occur in Year 2. The Refuge Outlet will be coordinated with the USFWS.

(7) Funding Plan and Letters of Commitment

The Non-Federal share of this project will be 52% and be funded entirely by the United Irrigation District. The Federal Share will be 48%. The District's Balance Sheet is included in Appendix "F" and reflects current funds available to the District. The Balance Sheet reflects the Districts ability to fund its share of the project cost. There are no other funding sources for this project. The District intends to commit marketed water sale of $1,139,500 to fund their share of the project. Table 8 summarizes funding sources. Note that the Year 1 Budget total is $1,193,232.77 (Federal share of $572,751.73).

Table 8
Funding Sources

Funding Sources	Total Funding Amount	Year 1 Only	% of Total
Non-Federal Entities	$1,445,060.16	$620,481.04	52%
Non-Federal Subtotal	**$1,445,060.16**	**$620,481.04**	52%
Other Federal Entities	$0.00	$0.00	-
Other Federal Subtotal	$0.00	$0.00	-
Requested Reclamation Funding	$1,333,901.69	$572,751.73	48%
Total Project Funding	**$2,778,961.85**	**$1,193,232.77**	100%

(8) Official Resolution

An official resolution will be adopted at the Board's next regular meeting on January 31, 2013.

(9) Budget Proposal

This project is submitted as a Funding Group II. The Year 1 phase is designed to accomplish each of the WaterSMART goals within the first year. Table 9 provides a breakdown of the cost per phase of the overall project. Phase I will contain the "Mile 5 ¼ Mission Main Canal South Lining", the "First Lift Suction Pipe Lining", "Wind Powered Second Lift Pump", "SCADA at Second Lift, Third Lift and Bryan Canal", "Resaca Outlet", and "Water Marketing". Phase II contains the "Mile 5 ¼ Mission Main Canal North Lining" and the "Flume Improvement". Phase III is the "Bryan Canal Lining". All Phases include contingencies, geotechnical engineering, and NEPA Compliance evenly distributed between them based on the percentages given to those three line items. Project Management was evenly distributed between the phases based on the number of projects in each phase.

Table 10 provides details on all seven proposed tasks for this grant application. United Irrigation District will use a combination of in-kind labor and subcontractor help to accomplish three of the seven components assigned to this application. The "Refuge Outlet" project, as well as the "Water Marketing" and "Canal Lining" will be entirely completed by District employees. The flume improvement will be complete by subcontractors. The regular working hours of the District are eight-hour work days from Monday thru Friday.

Table 9
Project Cost Estimate by Year

Year 1

Item	Description		Total Price
1	Mile 5 1/4 Mission Main Canal South Lining		$339,804.02
2	First Lift Suction Pipe Lining		$391,294.60
3	Wind Powered Second Lift Pump		$118,882.70
4	SCADA at 2nd & 3rd Lift and Bryan Canal		$108,287.94
5	Resaca Outlet		$28,600.35
6	Water Marketing		$19,463.40
	Project Reporting		$40,362.40
	Total Direct Project Cost		$1,046,695.41
	Contingencies	10%	$104,669.54
	NEPA Compliance	2%	$20,933.91
	Geotechnical Engineering	2%	$20,933.91
	Total Estimated Year 1 Cost		**$1,193,232.77**

Year 2

Item	Description		Total Price
1	Mile 5 1/4 Mission Main Canal North Lining		$438,456.80
2	Flume Replacement		$610,435.00
	Project Reporting		$16,144.96
	Total Direct Project Cost		$1,065,036.76
	Contingencies	10%	$106,503.68
	NEPA Compliance	2%	$21,300.74
	Geotechnical Engineering	2%	$21,300.74
	Total Estimated Year 2 Cost		**$1,214,141.91**

Year 3

Item	Description		Total Price
1	Bryan Canal Lining		$317,881.18
	Project Reporting		$8,072.48
	Total Direct Project Cost		$325,953.66
	Contingencies	10%	$32,595.37
	NEPA Compliance	2%	$6,519.07
	Geotechnical Engineering	2%	$6,519.07
	Total Estimated Year 3 Cost		**$371,587.17**

Total all Three Years **$2,778,961.85**

Table 10
Project Cost Estimate

Flume Replacement

Item	Description	Qty	Units	Unit Price	Total Price
Materials					
1	72" Contech DuroMAXX 15 PSI Irrigation Pipe	396	LF	$146.00	$57,816.00
2	72" Contech DuroMAXX 15 PSI Irrigation Pipe (Non-Nested)	220	LF	$191.00	$42,020.00
3	84" Contech DuroMAXX 15 PSI Drainage Pipe	396	LF	$174.00	$68,904.00
4	Miscellaneous Construction Material including Grout, Stainless Mounting Bolts, etc.	1	Lot	$500.00	$500.00
5	Fill Dirt	6,289	C.Y.	$15.00	$94,335.00
Subcontractors					
1	Pipe Installation	1012	LF	$100.00	$101,200.00
2	Dirt Compaction	6,289	C.Y.	$15.00	$94,335.00
3	Structural Subcontractor to Construct 6" Thick Concrete Canastas	150	C.Y.	$700.00	$105,000.00
Professional Services					
1	Registered Engineer	80	hours	$140.00	$11,200.00
2	Engineer in Training	40	hours	$90.00	$3,600.00
3	Sr. Cad Technician	160	hours	$75.00	$12,000.00
4	Administrative Assistant	15	hours	$55.00	$825.00
5	Senior Registered Surveyor	20	hours	$125.00	$2,500.00
6	Sr. Party Chief	80	hours	$70.00	$5,600.00
7	Instrument Man	80	hours	$40.00	$3,200.00
8	Registered Surveyor	40	hours	$110.00	$4,400.00
9	Attorney	10	hours	$300.00	$3,000.00
	Subtotal				$610,435.00

Table 10 (Continued)
Project Cost Estimate

Canal Linings

Item	Description	Qty	Units	Unit Price	Total Price
Materials					
1	Concrete	8,520	C.Y.	$110.00	$937,200.00
2	Fiber Mesh	14,425	lbs	$2.40	$34,620.00
District Labor					
1	Supervisor I	200	hours	$24.78	$4,956.00
2	Supervisor II	400	hours	$21.91	$8,764.00
3	Crew Leader	800	hours	$20.25	$16,200.00
4	Laborer 1	800	hours	$12.83	$10,264.00
5	Laborer 2	800	hours	$12.76	$10,208.00
Mileage					
6	Supervisor I Truck	5	weeks	$167.00	$835.00
7	Supervisor II Truck	10	weeks	$167.00	$1,670.00
8	Crew Truck	20	weeks	$196.00	$3,920.00
Equipment					
9	Backhoe	5	weeks	$1,875.00	$9,375.00
10	Dump Truck	5	weeks	$925.00	$4,625.00
11	Utility Trailer	15	weeks	$445.00	$6,675.00
12	Air Compressor	15	weeks	$144.00	$2,160.00
13	Water Pump	15	weeks	$158.00	$2,370.00
14	Generator	15	weeks	$105.00	$1,575.00
15	Wylie Tank	15	weeks	$580.00	$8,700.00
16	Shotcrete Pump	15	weeks	$630.00	$9,450.00
Professional Services					
1	Registered Engineer	60	hours	$140.00	$8,400.00
2	Engineer in Training	30	hours	$90.00	$2,700.00
3	Sr. Cad Technician	120	hours	$75.00	$9,000.00
4	Administrative Assistant	45	hours	$55.00	$2,475.00
	Subtotal				$1,096,142.00
	Subtotals by Canal				
	Bryan Canal				$317,881.18
	5 1/4 Canal South				$339,804.02
	5 1/4 Canal North				$438,456.80

Table 10 (Continued)
Project Cost Estimate

Lining First Lift Suction Pipelines

Item	Description	Qty	Units	Unit Price	Total Price
Subcontractors					
1	Subcontractor to Insituform Line Intake Pipes at Pump Station	360	LF	$1,000.00	$360,000.00
District Labor					
1	Supervisor I	10	hours	$24.78	$247.80
2	Supervisor II	20	hours	$21.91	$438.20
3	Crew Leader	40	hours	$20.25	$810.00
4	Laborer 1	40	hours	$12.83	$513.20
5	Laborer 2	40	hours	$12.76	$510.40
Mileage					
6	Supervisor I Truck	10	hours	$11.00	$110.00
7	Supervisor II Truck	20	hours	$11.00	$220.00
8	Crew Truck	40	hours	$20.50	$820.00
Professional Services					
1	Registered Engineer	80	hours	$140.00	$11,200.00
2	Engineer in Training	40	hours	$90.00	$3,600.00
3	Sr. Cad Technician	160	hours	$75.00	$12,000.00
4	Administrative Assistant	15	hours	$55.00	$825.00
	Subtotal				$391,294.60

Table 10 (Continued)
Project Cost Estimate

Wind Powered Second Lift Pump

Item	Description	Qty	Units	Unit Price	Total Price
Materials					
1	Windmill Pump Delivered to Site	1	Ea.	$69,930.00	$69,930.00
2	12" 100 PSI PIP PVC	170	L.F.	$6.05	$1,028.50
3	12"Ductile Iron Pipe	15	L.F.	$170.24	$2,553.60
4	18" PVC Well Suction	200	L.F.	$14.13	$2,826.00
5	12" Meter	1	Ea.	$2,500.00	$2,500.00
6	60" RCP Well	8	L.F.	$200.00	$1,600.00
7	1 Lot of Miscellaneous Materials	1	Lot	$250.00	$250.00
Subcontractors					
1	Installation of Wind Powered Pump	1	Ea.	$6,000.00	$6,000.00
2	Drilled Pier Contractor to provide drilled piers	4	Ea.	$4,000.00	$16,000.00
District Labor					
1	Supervisor I	10	hours	$24.78	$247.80
2	Supervisor II	20	hours	$21.91	$438.20
3	Crew Leader	40	hours	$20.25	$810.00
4	Laborer 1	40	hours	$12.83	$513.20
5	Laborer 2	40	hours	$12.76	$510.40
Mileage					
6	Supervisor I Truck	10	hours	$11.00	$110.00
7	Supervisor II Truck	20	hours	$11.00	$220.00
8	Crew Truck	40	hours	$20.50	$820.00
Professional Services					
1	Registered Engineer	20	hours	$140.00	$2,800.00
2	Engineer in Training	10	hours	$90.00	$900.00
3	Sr. Cad Technician	40	hours	$75.00	$3,000.00
4	Administrative Assistant	15	hours	$55.00	$825.00
5	Structural Engineer	1	hours	$5,000.00	$5,000.00
	Subtotal				$118,882.70

Table 10 (Continued)
Project Cost Estimate

SCADA at 2nd Lift, 3rd Lift, and Bryan Canal

Item	Description	Qty	Units	Unit Price	Total Price
Materials					
1	30" Diam. x 5' Deep Fiberglass Manholes	5	Ea.	$1,500.00	$7,500.00
2	1 Lot of Miscellaneous Materials	1	Lot	$250.00	$250.00
Subcontractors					
1	Eagle Automation Furnish & Install flow meters, sensors and SCADA automation	1	L.S.	$84,273.34	$84,273.34
District Labor					
1	Supervisor I	10	hours	$24.78	$247.80
2	Supervisor II	20	hours	$21.91	$438.20
3	Crew Leader	40	hours	$20.25	$810.00
4	Laborer 1	40	hours	$12.83	$513.20
5	Laborer 2	40	hours	$12.76	$510.40
Mileage					
6	Supervisor I Truck	10	hours	$11.00	$110.00
7	Supervisor II Truck	20	hours	$11.00	$220.00
8	Crew Truck	40	hours	$20.50	$820.00
District Equipment					
9	Backhoe	1	weeks	$1,875.00	$1,875.00
10	Trailer	1	weeks	$445.00	$445.00
Professional Services					
1	Registered Engineer	15	hours	$140.00	$2,100.00
2	Engineer in Training	40	hours	$90.00	$3,600.00
3	Sr. Cad Technician	50	hours	$75.00	$3,750.00
4	Administrative Assistant	15	hours	$55.00	$825.00
	Subtotal				$108,287.94

Table 10 (Continued)
Project Cost Estimate

Resaca Outfall Item Description	Qty	Units	Unit Price	Total Price
Materials				
1 18" 100 PSI PIP PVC Pipe	275	LF	$14.13	$3,885.75
2 18" Water Meter	1	Ea.	$3,000.00	$3,000.00
3 18" PVC 45 Degree Elbow	1	Ea.	$500.00	$500.00
4 Collar for Pipe Connection	1	Ea.	$1,000.00	$1,000.00
District Labor				
1 Supervisor I	10	hours	$24.78	$247.80
2 Supervisor II	20	hours	$21.91	$438.20
3 Crew Leader	40	hours	$20.25	$810.00
4 Laborer 1	40	hours	$12.83	$513.20
5 Laborer 2	40	hours	$12.76	$510.40
Mileage				
6 Supervisor I Truck	10	hours	$11.00	$110.00
7 Supervisor II Truck	20	hours	$11.00	$220.00
8 Crew Truck	40	hours	$20.50	$820.00
District Equipment				
9 Backhoe	1	weeks	$1,875.00	$1,875.00
10 Trailer	1	weeks	$445.00	$445.00
Professional Services				
1 Registered Engineer	40	hours	$140.00	$5,600.00
2 Engineer in Training	20	hours	$90.00	$1,800.00
3 Sr. Cad Technician	80	hours	$75.00	$6,000.00
4 Administrative Assistant	15	hours	$55.00	$825.00
Subtotal				$28,600.35

Table 10 (Continued)
Project Cost Estimate

Water Marketing				
District Labor				
1 Office Staff	40	hours	$20.96	$838.40
Professional Services				
1 Registered Engineer	20	hours	$140.00	$2,800.00
2 Sr. Cad Technician	40	hours	$75.00	$3,000.00
3 Administrative Assistant	15	hours	$55.00	$825.00
4 Attorney	40	hours	$300.00	$12,000.00
Subtotal				$19,463.40
Project Reporting				
1 Project Manager	480	hours	$130.00	$62,400.00
2 Office Staff	104	hours	$20.96	$2,179.84
Subtotal				$64,579.84
Total Direct Project Cost				**$2,437,685.83**
Contingencies	10%			$243,768.58
NEPA Compliance	2%			$48,753.72
Geotechnical Engineering	2%			$48,753.72
Total Estimated Project Cost				**$2,778,961.85**

Fringe benefits are a fixed cost to the District. All hourly rates provided in this budget include fringe benefits. Calculation of fringe benefits for each employee is based on a list provided by the District as follows:

• Social Security	7.25%
• Medicare	1.45%
• Health insurance	$2.50
• Worker's Compensation	5.80%
• Other	0.68% to 1.47% depending on each individual's payroll deductions.

The Project Manager will be Mr. Frank A. Ferris P.E. from Ferris & Flinn, LLC.
Mr. Ferris will oversee all seven project components associated with this application.

District labor is divided into three areas: labor work, supervision and office support. The budget represents labor hours for approximately 100 feet per day plus one day per each outlet connection. When cleaning the canals, the budget represents labor hours for cleaning approximately 1,000 feet per day. The budget estimate also represents being able to line approximately 500 feet of canal per day.

There will be three laborers that will work 100% of the time assigned to the completion of each of the component; however there is no construction labor involved in the "Water Marketing" project or "Flume Improvement" project. The lining of the canals is expected to take 20 weeks. Also, the District estimated a week of District labor for assistance with the installation of the windmill and windmill discharge. District employees will work for an additional week on the "Refuge Outlet" installing the pipeline and meter for the filling of the USFWS Resaca to the east of the United Irrigation District Pump Site and for a week aiding in the "Intake Lining". The SCADA meter manholes are expected to take one week as well. Supervision activities were objectively calculated by taking a percent of labor designated to the project. The District recognized that supervisors' functions might not involve project tasks at all times. Office support is the only activity assigned to the "Water Marketing" project. Office staff will ensure administrative implementation of water allocations established for the "Water Marketing" component.

The District's Engineer conducted a preliminary search for local professionals that are experts in services that will be needed for the completion of these tasks, such as Agua Works Pipes. For the "Wind Powered Pump" component, Mr. Ferris contacted the only manufacturer that provides for the installation of large wind powered pumps, Iron Man Windmill Co. The company was able to provide an estimation of services; however, the District will bid out subcontractor services if required by applicable law. Subcontractor work will be determined according to procurement practices and the laws of the State of Texas.

All materials associated with this project were estimated according to quote submissions from different local vendors that are able to provide materials required for these tasks. If more than one quote was provided, the most competitive pricing was selected for the purpose of this budget. In some instances, the District Engineer relied on professional experience and actual bids submitted to determine pricing for materials.

The District will comply with procurement practices and the laws of the State of Texas during the construction phase for actual purchase of materials related to this project. Equipment rates were determined taking into consideration the lowest rate according to estimated time of use. If equipment is to be used three days per week, the District will apply the weekly rate instead of the daily rate to calculate usage for reimbursement purposes. The District used available rates on currently owned equipment to determine equipment cost for the purpose of this budget and the software CostWorks 2012 to estimate average equipment rental rates for equipment that it currently doesn't own.

This budget lists all vehicles that will be used for traveling. The District assigned employees involved in the project vehicles that are needed to perform all seven tasks. Therefore, the District used an hourly or weekly rate for the vehicle based on CostWorks 2012.

The District estimated an additional 10% for contingencies. Funds under this item will be dedicated to any unforeseen events that might occur as well as potential inflation increases.

The District estimated 2% for Geotechnical Engineering services. Funds under this item will be used for the Geotechnical borings, testing, and reports for the "Flume Improvement" and drilled piers on the "Wind Pump".

All necessary Engineering and Surveying work will be completed by Ferris & Flinn, LLC. At this time, all preliminary Engineering work has been completed. The budget for this project reflects all work that will be performed to ensure the success of this project to the end.

Mr. Ferris will ensure that the District is in compliance with environmental and regulatory permits. In addition, he will prepare and submit, on behalf of the District, all necessary documents that might be needed by Reclamation (BOR) or any other regulatory entity to obtain such environmental and regulatory approvals. The District Engineer determined that the assigned environmental and regulatory compliance estimate of 2% will be sufficient to cover our required compliances. This project does not present an environmental threat to protected species in the area or vegetation. All four components will have a positive effect on the population and habitat. There is a potential for the reduction of utility costs to the municipal water consumer.

OMB Number: 4040-0008
Expiration Date: 06/30/2014

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$ 80,418.24	$	$ 80,418.24
2. Land, structures, rights-of-way, appraisals, etc.	$ 0.00	$	$ 0.00
3. Relocation expenses and payments	$ 0.00	$	$ 0.00
4. Architectural and engineering fees	$ 128,475.00	$	$ 128,475.00
5. Other architectural and engineering fees	$ 113,207.43	$	$ 113,207.43
6. Project inspection fees	$ 0.00	$	$ 0.00
7. Site work	$ 0.00	$	$ 0.00
8. Demolition and removal	$ 0.00	$	$ 0.00
9. Construction	$ 2,424,265.81	$	$ 2,424,265.81
10. Equipment	$ 0.00	$	$ 0.00
11. Miscellaneous	$ 0.00	$	$ 0.00
12. SUBTOTAL *(sum of lines 1-11)*	$ 2,746,366.48	$	$ 2,746,366.48
13. Contingencies	$ 32,595.37	$	$ 32,595.37
14. SUBTOTAL	$ 2,778,961.85	$	$ 2,778,961.85
15. Project (program) income	$ 0.00	$	$ 0.00
16. TOTAL PROJECT COSTS *(subtract #15 from #14)*	$ 2,778,961.85	$	$ 2,778,961.85

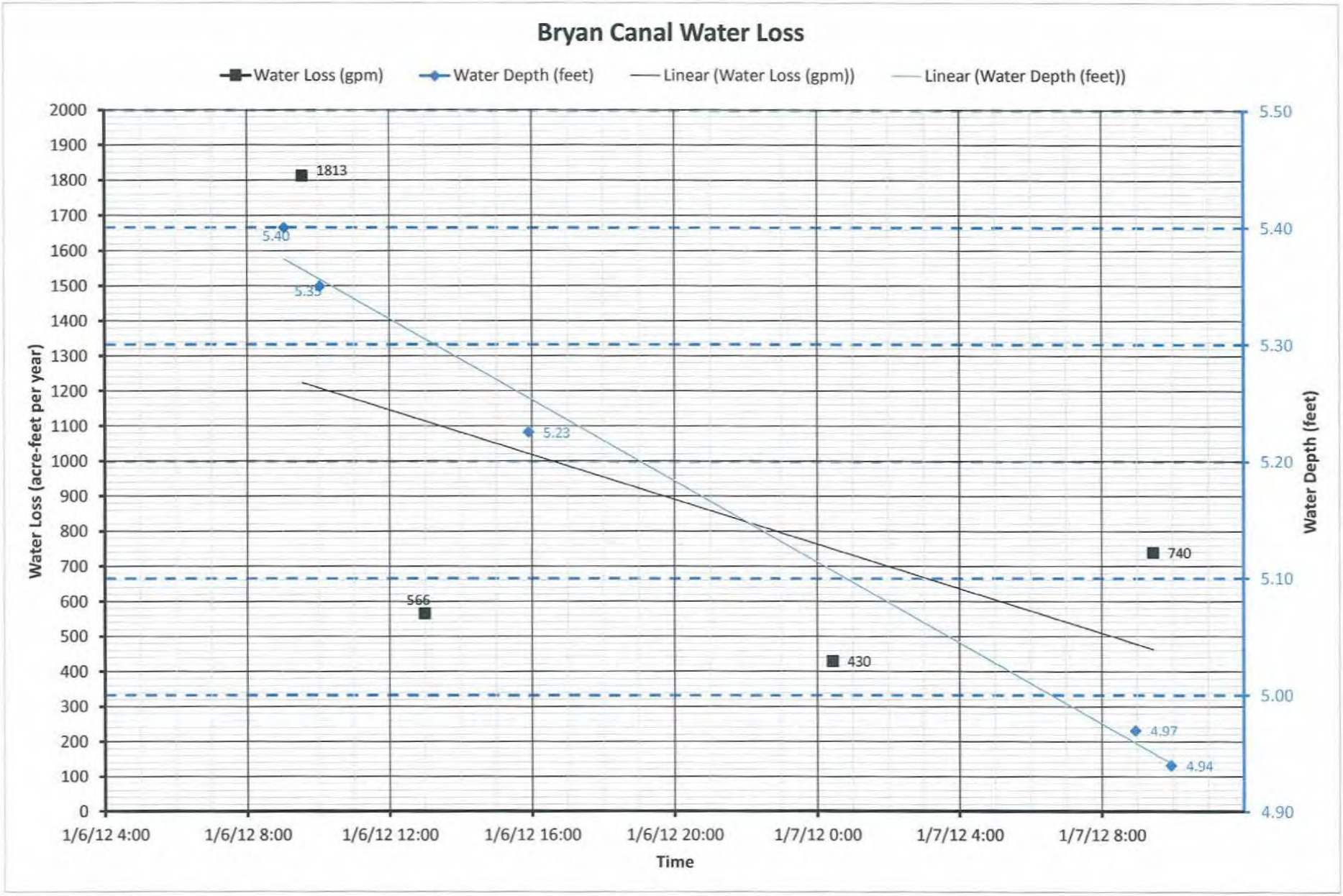
FEDERAL FUNDING

17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 48 %	$ 1,333,901.69

Test Results for BRYAN CANAL

Date & Time	Distance from Top of Concrete Walkway to Water Surface (feet)	Water Depth (Distance from top of concrete walkway to bottom of canal=11.35 feet)	Canal Width at Water Surface (feet)	Volume in Canal Width (gallons)	Water Loss (gallons per minute)	Cumulative Water Loss (gpm)	Water Loss (Acre Feet Per Year)	Notes
1/5/12 18:03	5.50	5.85	26.45					Water still overflowing check at this point. Measurement not used for graph.
1/6/12 9:03	5.95	5.40	25.10	4,132,059				
1/6/12 9:33					1124	1124	1813	
1/6/12 10:03	6.00	5.35	24.85	4,064,641				
1/6/12 12:59					351	463	566	
1/6/12 15:55	6.13	5.23	24.60	3,941,196				
1/7/12 0:26					267	323	430	
1/7/12 8:57	6.38	4.97	23.86	3,668,673				
1/7/12 9:27					459	329	740	
1/7/12 9:57	6.41	4.94	23.81	3,641,143				
Times in italics are averages of actual reading times to plot water loss between two time periods.								

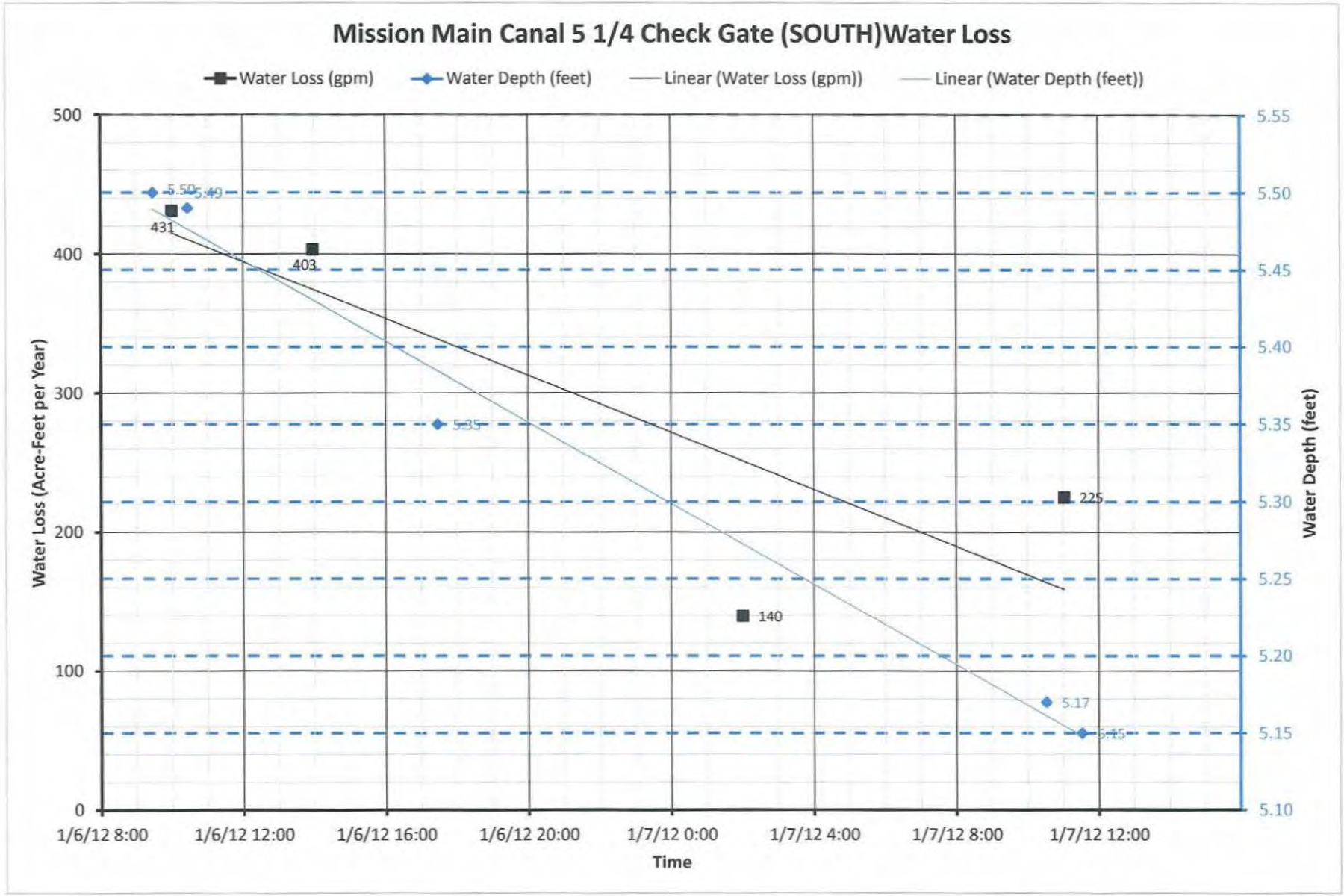
Estimated Loss per year (acre feet)		1,000
Canal Perimeter	36	feet
Canal Length	5829	feet
	1.10	mile(s)
Cost of Canal Lining	1.75	$/Square Foot
Water Loss per Mile of Canal	905.82	Ac.-Ft./Mile Yr
Total Area of Canal Liner	209844.00	Square Feet
Square Feet of Liner per Mile of Canal	190080.00	Square Feet/ Mile
Cost of Liner per Mile of Canal	332640.00	$/Mile
Estimated Efficiency of New Lining System	85.00%	
The final estimate of Water Loss is	**850**	**Acre-Ft/Yr**


Bryan Canal Water Loss
Water Loss (gpm)
Water Depth (feet)
Linear (Water Loss (gpm))
Linear (Water Depth (feet))
Water Loss (acre-feet per year)
Water Depth (feet)
Time
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
5.50
5.40
5.30
5.20
5.10
5.00
4.90
1/6/12 4:00
1/6/12 8:00
1/6/12 12:00
1/6/12 16:00
1/6/12 20:00
1/7/12 0:00
1/7/12 4:00
1/7/12 8:00
1813
5.40
5.33
5.23
566
430
740
4.97
4.94

Test Results for Mission Main Canal 5 1/4 Check Gate SOUTH

Date & Time	Distance from Top of Concrete Walkway to Water Surface (feet)	Water Depth (Distance from top of concrete walkway to bottom of canal=7.20 feet)	Canal Width at Water Surface (feet)	Volume in Canal Width (gallons)	Water Loss (gallons per minute)	Cumulative Water Loss (gpm)	Water Loss (Acre Feet Per Year)	Notes
1/5/12 17:35	1.40	5.80	14.05	2,282,290				Water still overflowing at this point. Measurement not used for graph.
1/6/12 9:28	1.70	5.50	13.40	2,086,304				
1/6/12 9:59					267		431	
1/6/12 10:27	1.71	5.49	13.30	2,070,542				
1/6/12 13:57					250	252	403	
1/6/12 17:28	1.85	5.35	12.85	1,965,257				
1/7/12 2:00					87	139	140	
1/7/12 10:32	2.03	5.17	12.65	1,876,594				
1/7/12 11:02					140	139	225	
1/7/12 11:32	2.05	5.15	12.64	1,868,212				
Times in italics are averages of actual reading times to plot water loss between two time periods.								

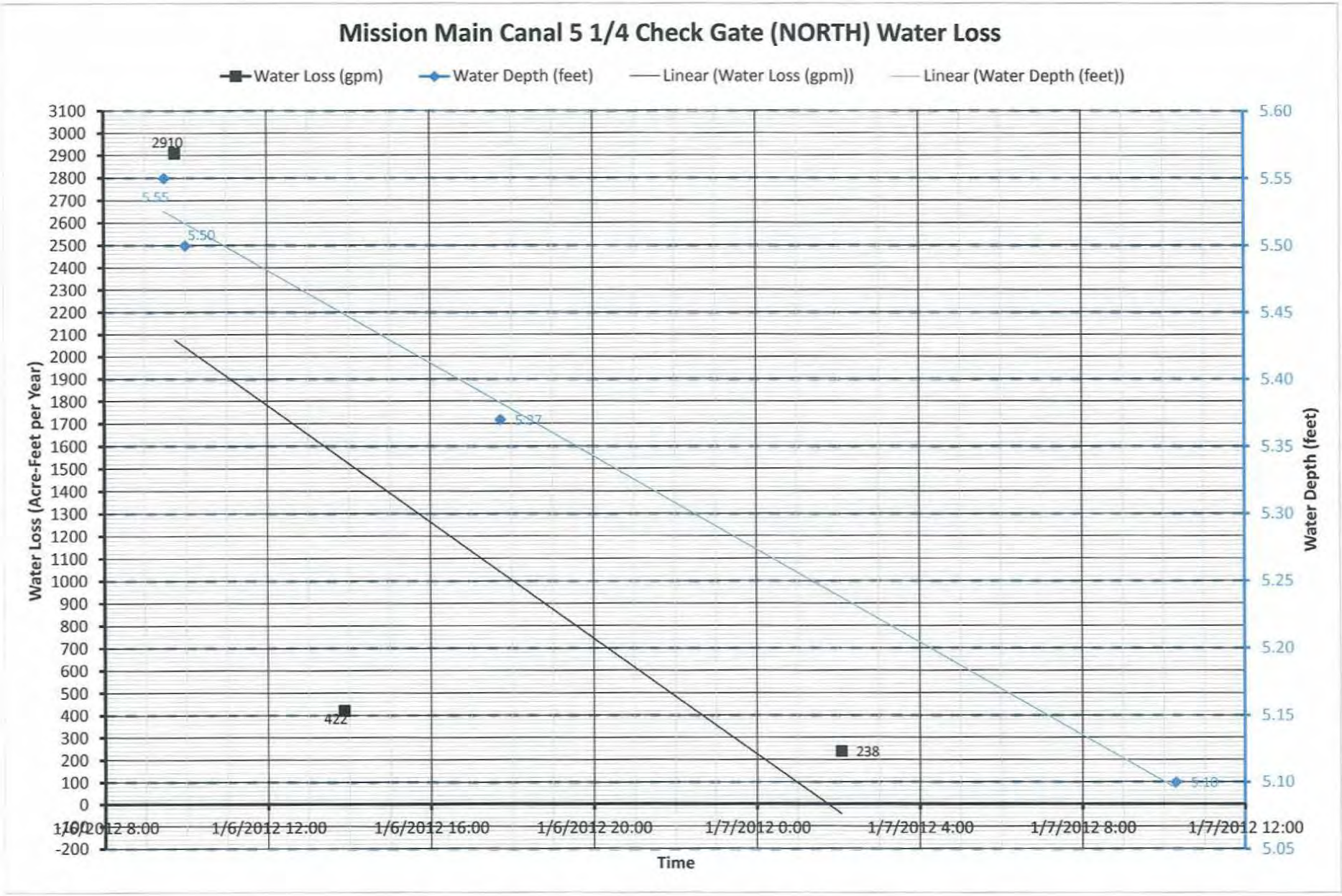
Estimated Loss per year (acre feet)		350
Canal Perimeter	27	feet
Canal Length	10235	feet
	1.94	mile(s)
Cost of Canal Lining	1.75	$/Square Foot
Water Loss per Mile of Canal	180.56	Ac.-Ft./Mile Yr
Total Area of Canal Liner	276345.00	Square Feet
Square Feet of Liner per Mile of Canal	142560.00	Square Feet/ Mile
Cost of Liner per Mile of Canal	249480.00	$/Mile
Estimated Efficiency of New Lining System	85.00%	
The final estimate of Water Loss is	**298**	**Acre-Ft/Yr**


Mission Main Canal 5 1/4 Check Gate (SOUTH)Water Loss
Water Loss (gpm)
Water Depth (feet)
Linear (Water Loss (gpm))
Linear (Water Depth (feet))
Water Loss (Acre-Feet per Year)
Water Depth (feet)
Time
500
400
300
200
100
0
5.55
5.50
5.45
5.40
5.35
5.30
5.25
5.20
5.15
5.10
1/6/12 8:00
1/6/12 12:00
1/6/12 16:00
1/6/12 20:00
1/7/12 0:00
1/7/12 4:00
1/7/12 8:00
1/7/12 12:00
431
403
225
140
5.50
5.49
5.35
5.17
5.15

Test Results for Mission Main Canal 5 1/4 Check Gate NORTH

Date & Time	Distance from Top of Concrete Walkway to Water Surface (feet)	Water Depth (Distance from top of concrete walkway to bottom of canal=7.30 feet)	Canal Width at Water Surface (feet)	Volume in Canal Width (gallons)	Water Loss (gallons per minute)	Cumulative Water Loss (gpm)	Water Loss (Acre Feet Per Year)	Notes
1/5/2012 17:35	1.38	5.93	15.25	2,486,479				Water still overflowing at this point. Measurement not used.
1/6/2012 9:29	1.75	5.55	14.30	2,214,164				
1/6/2012 9:44					1804		2910	
1/6/2012 10:00	1.80	5.50	14.00	2,158,246				
1/6/2012 13:52					261	358	422	
1/6/2012 17:44	1.93	5.37	13.40	2,036,991				
1/7/2012 2:04					148	218	238	
1/7/2012 10:18	2.20	5.10	13.00	1,890,100				
Times in italics are averages of actual reading times to plot water loss between the two time periods.								

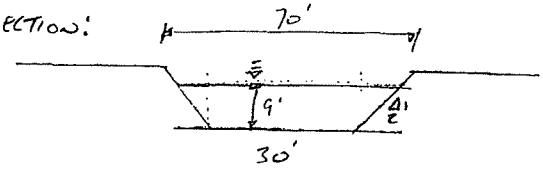
Estimated Loss per year (acre feet)		1400
Canal Perimeter	27	feet
Canal Length	7810	feet
	1.48	mile(s)
Cost of Canal Lining	1.75	$/Square Foot
Water Loss per Mile of Canal	946.48	Ac.-Ft./Mile Yr
Total Area of Canal Liner	210870.00	Square Feet
Square Feet of Liner per Mile of Canal	142560.00	Square Feet/ Mile
Cost of Liner per Mile of Canal	249480.00	$/Mile
Cost of Saving an Ac.-Ft per Year	264	$/Ac.-Ft./Yr
Estimated Efficiency of New Lining System	85.00%	
The final estimate of Water Loss is	**1,190**	**Acre-Ft/Yr**


Mission Main Canal 5 1/4 Check Gate (NORTH) Water Loss
Water Loss (gpm)
Water Depth (feet)
Linear (Water Loss (gpm))
Linear (Water Depth (feet))
Water Loss (Acre-Feet per Year)
Water Depth (feet)
Time
2910
422
238
5.55
5.50
5.37
5.10
1/6/2012 8.00
1/6/2012 12.00
1/6/2012 16.00
1/6/2012 20.00
1/7/2012 0.00
1/7/2012 4:00
1/7/2012 8:00
1/7/2012 12:00

① 1ST LIFT → FLUME

L = 4.50 MILES ⇒ 23,760'

X-SECTION:



AREA = (30' x 9') + ((9' x 2) * 9') = 432 sf

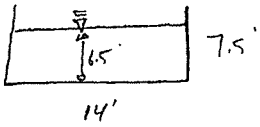
VOLUME = 10,264,320 cf

* DEPTH = FULL CANAL W/ 1' OF FREEBOARD

② FLUME

L = 120'

X-SECTION



A = 91 sf

VOLUME = 10,920 cf

TOTAL VOLUME = 16,037,127.6 CF

= 368 AC-FT/YRS

= 74 AC-FT/YR

③ FLUME → EXP 83

L = 1.15 MILES ⇒ 6072'

X-SECTION: SAME AS #1

A = 432 sf

VOLUME = 2,623,104 cf

④ EXP 83 SIPHON

L = 556'

A = 12' x 8' = 96 sf

VOLUME = 53,568 cf

⑤ EXP 83 → 1ST ST.

L = .40 MILES ⇒ 2112'

A = 432 SF

VOLUME = 912,384 cf

⑥ 1ST STREET SIPHON

L = 121'
A = 12'x8' = 96 sf
VOLUME = 11,616 cf

⑦ 1ST STREET → 4TH STREET

L = .22 MILES ⇒ 1161.6'
A = 432 sf
VOLUME = 501,811.2 cf

⑧ 4TH STREET SIPHON

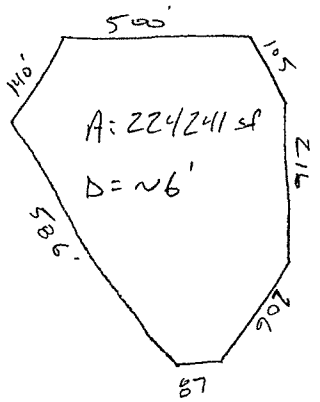
L = 65'
A = 12'x8' = 96 sf
VOLUME = 6240 cf

* ASSUME SAME AS 1ST STREET FOR AREA

⑨ 4TH STREET → 2ND LIFT STATION

L = .14 MILES ⇒ 739.2'
A = 432 sf
VOLUME = 319,354.4 cf

⑩ MISSION RESERVOIR



VOLUME ~ 1,345,446 cf

Appendix "C" - Iron Man Windmill Data

35FT PUMPING ELEVATION RESET

WINDMILL DIAMETER >	8-Ft	12-Ft	16-Ft	20-Ft
STRONG WINDS	**907**	**2068**	**4929**	**10830**
MEDIUM WINDS	**499**	**1138**	**2711**	**5957**
LIGHT WINDS	**227**	**517**	**1232**	**2708**
PUMP DIAMETER IN INCHES	4.25	7.0	10	14

Values shown are GALLONS pumped PER HOUR.

7	8	9	÷
4	5	6	x
1	2	3	-
C	0	=	+

Normally, there is some variation in wind speed throughout the day. Estimate how many hours of the different wind speeds you have at your site and multiply by the pumping capacity shown then add the three totals and you will have a close estimate of how much water you will get per day. Be sure you will get enough water at the time of year when the need is greatest or when the wind is at the lowest seasonal level. It is good economics to plan for future needs.

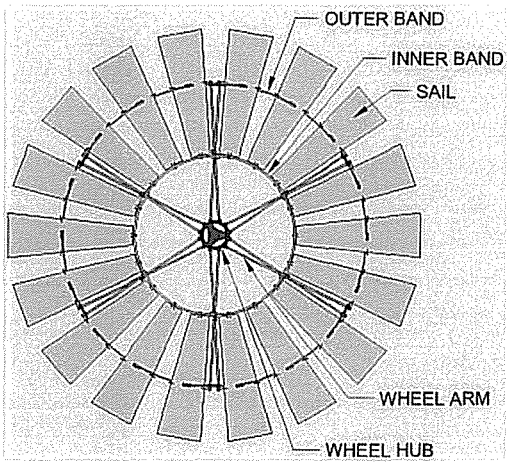
IRON MAN WINDMILL CO™

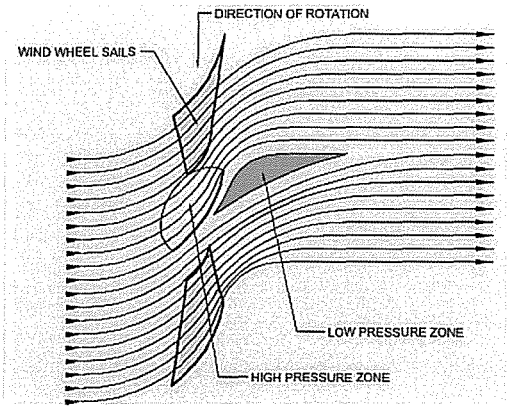
HOW WATER PUMPING WINDMILLS WORK

The IRON MAN Windmill™ is a modern version of the Traditional American Water Pumping Windmill. This legendary machine has dependably provided significant amounts of water, serving the needs of farms, families and communities with only minimal attention for over 150 years. First designed in the mid 1800's, the traditional American windmill has been improved with countless innovations and is now a highly refined and successful technology that is only slightly reminiscent of it predecessors. The Iron Man Windmill is able to pump impressive amounts of water in very light breezes as it lifts water economically to elevations greater than 1200ft (400M). It has a practical working life greater than 1/2 a century with proper maintenance. They routinely survive storms that wreck buildings without suffering damage. Many earlier models of the traditional American Windmill are still working today after providing 70 or more years of dependable service. Iron Man Windmill™ Co. is proud to continue this long tradition while working consistently to improve our windmills and striving to make them even more affordable.

While they are simple in operation, they incorporate many details that are necessary for proper operation, protection from storms, providing correct lubrication of the moving parts and ultimately a long and trouble free life. We will describe and attempt to explain the operation of the major components here.

Two or more heavy steel bands support the sails and maintain proper alignment. They also provide strength to hold the wind wheel together in strong winds, when the centrifugal forces can be great. Strong steel Wheel Arms connect to the Hub to hold the Bands in alignment and provide strength like the spokes in a bicycle wheel.



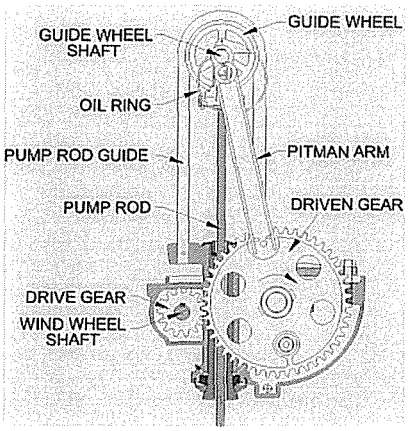


All IRON MAN Windmills™ use a steel multi-bladed wind wheel. Multiple curved sails are rigidly mounted at an angle to the wind. As the wind passes through the opening between the sails, it is compressed on the face of the sail. As it exits the wind wheel, an area of low pressure is created behind the sail. It is this difference in pressure that applies a force against the sail, causing it to rotate. This design provides a high torque at very low wind speeds. Because low wind speeds are the most common, it is essential that water-pumping windmills work in low wind speeds.

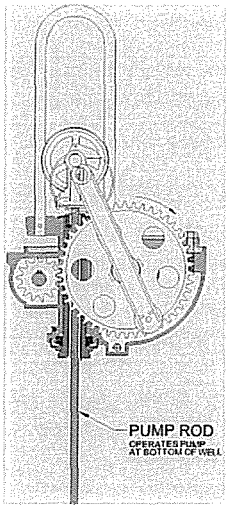
This design is not a product of accident! It is the result of two years of meticulous scientific study where more than 2000 tests were conducted on 65 different designs of wind wheels and many variations of these designs. The result is the lightest, strongest and most efficient wind wheel ever used on a water pumping windmill. Although there has been many attempts to improve on this design, it still stands unchallenged as the most practical design yet produced. It is interesting to note that the design has been so well refined, that small changes, even to the curvature of the sail, result in a reduction of pumping ability. While countless efforts to improve this design have been made, it still reigns supreme, especially when working in very low wind speeds.

The Hub in the center of the Wind wheel is attached to the Wind Wheel Shaft (often called the "Main Shaft") of the windmill gearbox. The wind wheel rotates and causes the Wind Wheel Shaft to turn. The Wind Wheel Shaft is supported by bearings, usually made of Babbitt metal, which has been found over many years to provide excellent service in windmills. The Main Shaft supports 2 Drive Gears, often called the Small or Pinion Gears. The two Drive Gears rotate causing the two Driven Gears (often called large gears) to rotate. Two Pitman Arms are caused to move up and down as the Driven Gears rotate. The Pitman Arms cause the Guide Wheel and the other parts attached to the Guide Wheel Shaft to move up and down, completing one pumping cycle. The Oil Ring is one of many special devices used to lubricate the various parts. In this case it carries oil from the outside of the large gears up to the Guide Wheel Shaft and the Guide Wheel. The Wind Wheel of most Traditional American Windmills turns about 3-2/3 times to complete one cycle. Some direct drive windmills that do not use gears have been produced, but have not been as successful as back geared windmills, like the examples shown here.

PUMP ROD IS SHOWN AT THE TOP OF THE STROKE



PUMP ROD IS SHOWN AT THE BOTTOM OF THE STROKE



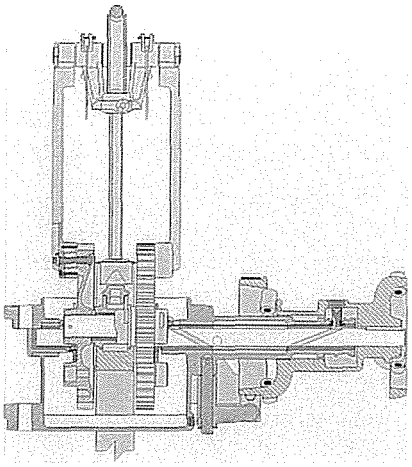
Left, the Pitman Arms are at the bottom of the stroke. The Guide Wheel keeps the Pump Rod moving in a straight line for the full length of the stroke. If you look closely, you can see that the Large Gears have two provisions for supporting the Pitman arms. The common position provides a long stroke, which is the normal stroke. The other provisions allow the windmill to operate with a short stroke. The use of the short stroke allows water to be pumped in lower wind speeds or to pump water higher than is usual. This can be a very important feature if the water level in your well drops, or there is a long period of very light winds. With normal wind and water conditions, the short stroke is not used.

When the short stroke is used, it is also necessary to change the guide wheel shaft to the lower set of holes at the top of the Pitman Arms. If this is not done, the oil ring(s) cannot come in contact with the large gears and no oil will get to the parts at the top of the gearbox!

The IRON MAN Windmill™ uses two sets of gears and Pitman Arms. This has the advantage of dividing the load so each Driven Gear and Pitman Arm carries only half the load. This type of pumping mechanism is very important for long life and efficient operation.

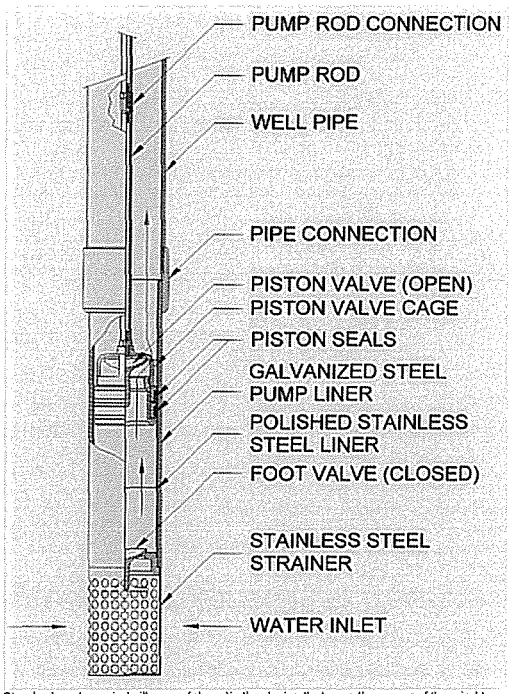
The windmill gearbox provides the motion and lifting force necessary to literally lift the water from its source. The windmill pump lifts the entire column of water from the surface of the water in the bottom of the well.

This is why it is necessary for windmills to have a strong and efficient mechanism.



WINDMILL PUMP

Modern standard windmill pump
Located below water level in well.



Standard modern windmill pump (above)is the device that uses the power of the wind to lift the water to a higher elevation. Water is lifted to the surface when the pump rod raises the piston. The piston contains a valve(s) that opens when the piston decends to alow water to pass above the piston. The direction of the piston reverses now moving upward and water is moved up the pipe towards the surface. Water is also drawn into the lower section of the pump cylinder through a protective screen and lower check valve. When the pump rod reverses again and begins to descend, the lower check valve closes and the piston check valve opens allowing the water in the cylinder to pass through the piston check valve and become trapped above the piston when the check valve closes. Valve operation is completely automatic. The cycle is constantly repeated as the wind wheel is rotated by the wind, operating the reciprocating mechanism in the gearbox, which causes the pump rod and piston to move upward and downward.

Standard modern windmill well pump (left) connects to the bottom of a string of pipe. See illustration at the top of this page. The Pump Rod transmits the recriprocation motion from the gearbox to the pump piston through the full length of well pipe. The pumping cycle is slow and steady, reducing friction and allowing operation at higher efficiency than is possible with rotary pumps. Rotary pumps require much higher speeds and hence suffer from increased losses due to friction that are not experienced by a windmill pump. It is always best to locate the pump cylinder below the lowest level of water for the most dependable operation.

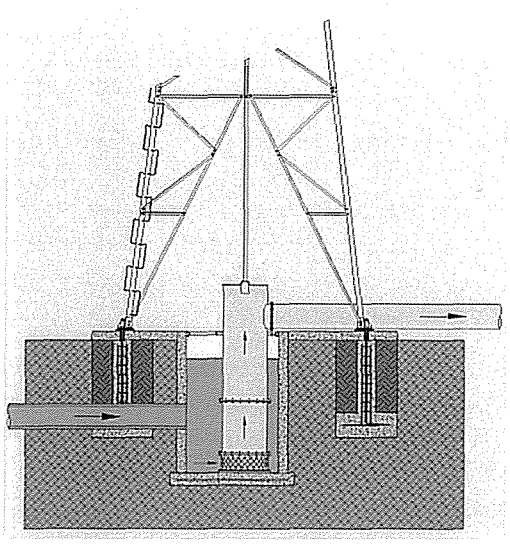
Iron Man Windmill Pumps use a stainless steel liner with a highly polished inside diameter. This SS liner is pressed into a hot galvanized steel casing that has been properly prepared. Old fashon windmill pumps used piston seals, often called leathers or pump buckets. While leather seals have provided good service through the years, they suffer from considerable friction when working on the cylinder wall and hence limit operation efficency to about 50% (see note 1). Iron Man Pumps do not use any leather seals or any leather parts. All seals are made in our factory from either a special formulation of Poly-urethane or Poly-Ethylene, depending on the type of service. Modern pump seals work with reduced operating friction. In turn, this reduces the load on the gearbox and bearings allowing the windmill to begin working in lighter winds and allowing the windmill to operate at a higher rate of speed pumping more water than is possable when leather seals are used. Seal life has also been extended an average of about 100%. Pumps for shallow well service - up to 60ft - are usually provided with 2 piston seals. Pumps used with higher pumping elevations are provided with 3 or four piston seals.

Accurately machined hemispherical poppet valves are used exclusively in all pumps from 2in inside diameter to 10in inside diameter. They provide the most efective seal, opening and closing quickly. Smaller pumps are provided with ball valves, larger pumps use two or more flapper valves that are mounted on and faced with silicon sheet as a hinge and a seal. Silicon valve facing costs more but seals better and greatly outlasts neoprene or leather. Valve ports of the largest diameter possable are used to maximize the free flow of water through the ports and around the valves.

Iron Man well pumps are available in two configurations - open top and closed top. Open top pumps allow the pump rod to be disconnected and easily removed, without having to remove the well pipe. This makes replacing the piston valves a snap. An optional removable foot valve allows the piston to be lowered and rotated, causing the bottom of the piston to connect with the foot valve cage. Both can then be lifted to the surface for servicing without any need to remove the well pipe. This is a great convenience when servicing deep well pumps. Iron Man Windmill Co. regularly provides standard or special pumps of all sizes and types for every pumping application.

Iron Man Agricultural Pumps (right) are capable of lifting large amounts of water short elevations. These high capacity pumps are an ideal solution for wind powered agricultural drainage. Tile lines drain excess ground water into a cistern. The water is then lifted in a large pump up to a higher elevation and flows to a location where it can be removed without causing further problems.

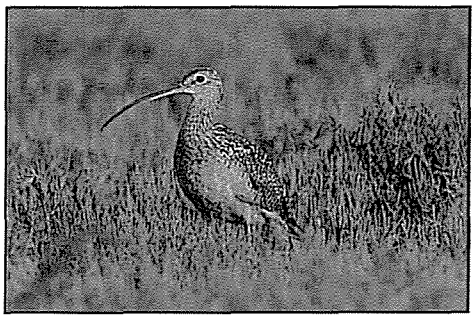
See an Iron Man Agricultural Pump in operation.

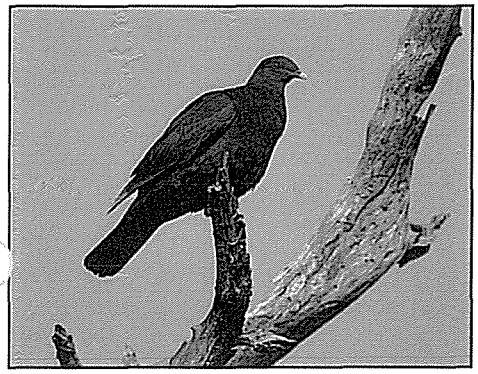


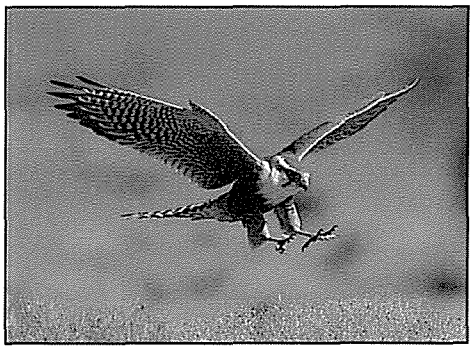
U.S. Fish & Wildlife Service

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

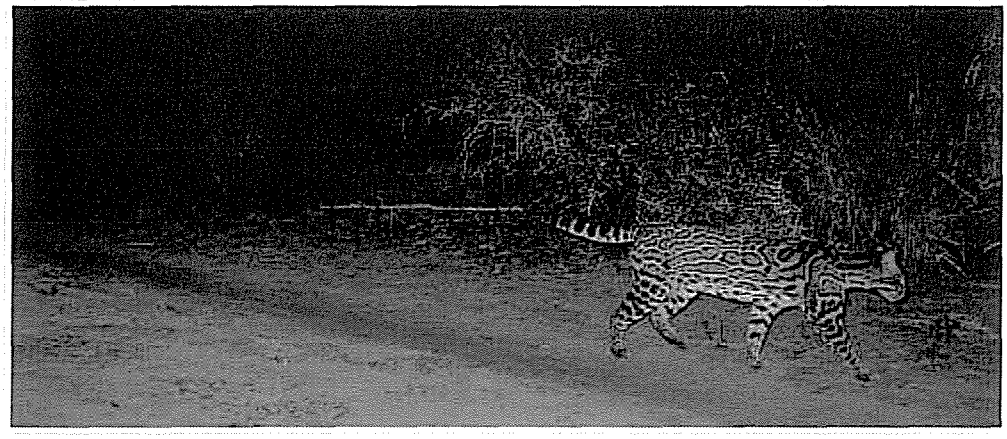
U.S. Fish & Wildlife Service

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.

e 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

Note: Only one page of the plan is provided due to page number limitations. The remainder of the plan is available upon request.

UNITED IRRIGATION DISTRICT
WATER CONSERVATION AND DROUGHT CONTINGECY PLAN
EFFECTIVE FEBRUARY 9, 2006

In view of the current storage in available water supply storage from the Rio Grande in Falcon and Amistad Reservoirs and drought conditions in the Rio Grande Valley, the Board of Directors of United Irrigation District ("District") deems it in the best interest of the District to modify the ongoing water conservation plan approved May 14, 1998 and make applicable to irrigation water users in the District.

1. **Institution of Water Conservation and Drought Contingency Plan.** The Water Conservation and Drought Contingency Plan ("Plan") will go into effect as determined by and in the discretion of the Board of Directors of the District. Written notice of institution of the program will be given to irrigation water users in the District. After the Program is instituted, it shall remain in effect until further order of the Board or when the Board determines that the existing water supply shortage no longer exists or determines that the Program should be modified.

2. **Description of Plan.** The Board of Directors continually reviews data from the office of the Rio Grande Water Master in order to determine when best to implement a drought contingency plan. After careful study of all pertinent data the Board will determine that if the District has a maximum of an 18-month supply or a minimum of 1-year supply of water remaining then the drought contingency shall take effect and remain in effect until such time that conditions change at Falcon and Amistad reservoirs to insure a greater than 18-month supply of water. The Program is a conservative approach in which the District shall promote water conservation. In order to accomplish this, the District shall allocate (6) hours of irrigation water per acre. The accounting for water use shall be based upon the same parcels of land as identified by ownership for flat rate assessment purposes as shown in the records of the District (referred to as the "flat rate tract").

Each acre of land in the flat rate tract is allowed only those hours of irrigation presently available to each tract of land. The current rate is $5.75 per hour. After an irrigation user has exceeded the irrigation hours allotted to each acre in their flat rate tract, water deliveries shall thereafter be stopped until such time as the property receives a future allocation or the owner of said property purchases water from outside sources and transfers that water to the District to be credited to their account.

All metered water will be charged at the District's normal rate of $51.76 per acre-foot for water delivered.

The above rate will be charged so long as the Plan is in effect. All water deliveries are subject to the District's ability to deliver irrigation water based upon its water allocation from the Rio Grande Water Master pursuant to the District's water rights.

3. **Transfers.** Irrigation users may transfer irrigation hours from one flat rate tract owned controlled by the irrigation user to another flat rate tract owned or

UNITED IRRIGATION DISTRICT OF HIDALGO COUNTY
STATEMENT OF NET ASSETS AND GOVERNMENTAL FUNDS
BALANCE SHEET
SEPTEMBER 30, 2012

ASSETS

	General	Capital Projects	Totals	Adjustments Note 3	Statement of Net Assets
CURRENT ASSETS					
Deposits and Investments					
Petty Cash	$ 300	$ -	$ 300	$ -	$ 300
Cash and Cash Equivalents	264,626	101,936	366,562	-	366,562
Short Term Investments	250,000	1,458,407	1,708,407	-	1,708,407
Total Deposits and Investments	514,926	1,560,343	2,075,269	-	2,075,269
Flat Rate Assessment Receivable, net	501,491	-	501,491		501,491
Account Receivable:					
City of McAllen	55,596	-	55,596	-	55,596
City of Mission	78,567	-	78,567	-	78,567
Sharyland Water Supply	32,293	-	32,293	-	32,293
Other	162,660	-	162,660	-	162,660
Prepaid Insurance	27,203	-	27,203	-	27,203
Inventories	89,628	-	89,628	-	89,628
Total Current Assets	1,462,363	1,560,343	3,022,706	-	3,022,706
NON CURRENT ASSETS					
Long Term Investments		150,000	150,000		150,000
Grant Receivable - Long Term	-	1,526,659	1,526,659	-	1,526,659
Total Non Current Assets	-	1,676,659	1,676,659	-	1,676,659
CAPITAL ASSETS	-	-	-	7,855,147	7,855,147
Total Assets	$ 1,462,363	$ 3,237,004	$ 4,699,366	$ 7,855,147	$ 12,554,513

The accompanying notes are an integral part of these financial statements.

UNITED IRRIGATION DISTRICT OF HIDALGO COUNTY
STATEMENT OF NET ASSETS AND GOVERNMENTAL FUNDS
BALANCE SHEET
SEPTEMBER 30, 2012

(Continued)

LIABILITIES AND FUND BALANCES/NET ASSETS

	General	Capital Projects	Totals	Adjustments Note 3	Statement of Net Assets
LIABILITIES					
Accrued Expenses	$ 102,718	$ -	$ 102,718	$ -	$ 102,718
Deferred Revenue					
Assessments	507,270	-	507,270	(507,270)	-
Total Current Liabilities	609,989	-	609,989	(507,270)	102,718
FUND BALANCES / NET ASSETS					
Fund Balance:					
Nonspendable:					
Prepaid Insurance	27,203	-	27,203	(27,203)	
Inventories	89,628	-	89,628	(89,628)	-
Long Term Receivables		1,526,659	1,526,659	(1,526,659)	-
Committed:					
Rehabilitation Projects	-	1,710,344	1,710,344	(1,710,344)	-
Unassigned	735,543	-	735,543	(735,543)	-
Total Fund Equity	852,374	3,237,004	4,089,376	(4,089,377)	-
Total Liabilities and Fund Equity	$ 1,462,363	$ 3,237,004	$ 4,699,366		
NET ASSETS:					
Invested In Capital Assets, Net of Related Debt				7,855,147	7,855,147
Unrestricted				4,596,648	4,596,648
Total Net Assets				$ 12,451,795	$ 12,451,795

The accompanying notes are an integral part of these financial statements.

UNITED IRRIGATION DISTRICT OF HIDALGO COUNTY
STATEMENT OF ACTIVITIES AND GOVERNMENTAL FUNDS REVENUES,
EXPENDITURES, AND CHANGES IN FUND BALANCES
FOR THE YEAR ENDED SEPTEMBER 30, 2012

REVENUES	General	Capital Projects	Total	Adjustments Note 4	Statement of Activities
Flat Rate Assessments, net	$ 398,489	$ -	$ 398,489	$ 8,554	$ 407,043
Bond Assessment Revenues	57	-	57	-	57
Water - Irrigation	386,178	-	386,178	-	386,178
Water - Non-irrigation	1,139,863	-	1,139,863	-	1,139,863
Interest	1,260	9,157	10,417	-	10,417
Penalties	29,720	-	29,720	-	29,720
Other Revenues (10-16)	620,813	361,338	982,151	-	982,151
Sale of Assets	197,549	-	197,549	-	197,549
Water Contracts (D-16)	522,867	-	522,867	-	522,867
Total Revenues	3,296,798	370,494	3,667,292	8,554	3,675,846
EXPENDITURES					
General and Administrative	947,980	-	947,980	-	947,980
Maintenance	569,930	-	569,930	-	569,930
Operating	1,056,335	-	1,056,335	-	1,056,335
Depreciation	-	-	-	351,563	351,563
Capital Outlays	246,519	797,247	1,043,766	(1,043,766)	-
Total Expenditures	2,820,764	797,247	3,618,011	(692,203)	2,925,808
Excess (Deficiency) of Revenues Over Expenditures from Operations	476,034	(426,753)	49,281	700,757	
OTHER SOURCES (USES)					
Operating Transfers In	-	154,340	154,340	(154,340)	-
Operating Transfers Out	(154,340)	-	(154,340)	154,340	-
Total Other Sources (Uses)	(154,340)	154,340	-	-	-
Excess (Deficiency) of Revenues Over Expenditures from Operations and Other Sources (Uses)	321,694	(272,412)	49,281	(49,281)	-
Change In Net Assets				750,038	750,038
Fund Balance/Net Assets Beginning of Year	530,679	3,509,416	4,040,095	7,661,662	11,701,757
Ending Fund Balance/Net Assets	$ 852,373	$ 3,237,004	$ 4,089,376	$ 8,362,419	$ 12,451,795

The accompanying notes are an integral part of these financial statements.

UNITED IRRIGATION DISTRICT OF HIDALGO COUNTY
SCHEDULE OF LIFT EXPENDITURES
FOR THE YEARS ENDED SEPTEMBER 30, 2012 AND 2011

LIFT EXPENDITURES FOR YEAR ENDED SEPTEMBER 30, 2012

	Total	First Lift	Second Lift	Third Lift
Gas	$ 120,082	$ 47,725	$ 51,436	$ 20,921
Electricity	234,894	34,156	164,237	36,501
Supplies and maintenance	135,049	32,320	81,002	21,727
Telephone	3,331	464	2,868	-
Other	5,476	5	4,233	1,238
Total Expenditures	$ 498,832	$ 114,670	$ 303,776	$ 80,386

LIFT EXPENDITURES FOR YEAR ENDED SEPTEMBER 30, 2011

	Total	First Lift	Second Lift	Third Lift
Gas	$ 164,778	$ 68,492	$ 65,617	$ 30,670
Electricity	271,714	14,288	202,829	54,598
Supplies and maintenance	61,303	19,479	29,866	11,958
Telephone	3,039	950	2,088	-
Other	21,551	-	10,496	11,055
Total Expenditures	$ 522,384	$ 103,208	$ 310,895	$ 108,281

IRON MAN WINDMILL CO.

PROFORMA INVOICE

Quote Number #IWC-130114TX3 **Importer / Seller:** **IRON MAN WINDMILL CO LTD.** DIV OF INTERNATIONAL WINDMILL CORP. 1292 High Street, Suite 186, Eugene, OR 97401 USA	**Consignee Name and Address:**
Master Importer / Account Receivable: Beneficiary's Account Name **INTERNATIONAL WINDMILL CORP** Beneficiary's Bank **JP MORGAN CHASE BANK** 3333 W. 11th Ave #G, Eugene, OR 97402 U.S.A Ph: 541 465 3630 SWIFT : CHASUS33 Routing No. 325070760 Account No. 3401372292	**Estimated Date of Shipment:** xx days from deposit received or Subject to confirmation at the time of order **Currency:** USD **Conditions of Sale and Terms of Payment:** 50% deposit at the time of order 50% balance plus shipping fee at the time of shipping **Payment Method:** Bank Wire Transfer (TT)

	Item Number, Product Description	Qty	Wt. (Kg)	Unit (USD)	Total (USD)
1	IRONMAN 702 WINDMILL 6M (20ft) diameter	1	2,200	26,800	26,800
2	HEAVY DUTY STEEL 4-LEG TOWER L20 (67ft) high	1	2,680	23,050	23,050
3	IRON MAN WELL PUMP: 14" diameter	1	219	5,800	5,800
4	IRON MAN PUMP ROD No. 4 up to 36'			500	500
5	WELL PIPE GALVANIZED 14" up to 36'			9,980	9,980
	EQUIPMENT TOTAL				**66,130**
6	Estimated FOB Freight to Houston, TX USA				3,800
7	On-site Support @$1,000/day 3-day 2-technicians	**3*2**		**1,000**	6,000
	TOTAL				**75,930**

NOTE:

Line 7 pricing includes labor cost for two technicians to supervise the installation, perform critical high work and to assure that the installation work is properly completed. Travel and accommodations are extra.

Authorized Signature:	INTERNATIONAL WINDMILL CORP.
	Title: V.P. / CFO
Name: Sally Conlon	E-mail: sally@ironmanwindmill.com
Date: January 14, 2013	Ph: 1 541 359-0859 / 86 27 8445 3080

EAGLE
AUTOMATION CORPORATION
Keeping A Sharp Eye On Operations
P.O. Box 271446
Corpus Christi, TX 78427
Phone: 361-857-8446
Fax: 361-857-8451

Estimate

Date	Estimate #
1/15/2013	1094C

Name / Address
United Irrigation District PO 877 Mission, TX 78573 Attn: Mike Warshak

Estimate Valid for 30 Days

Rep	Project
AM	Bryan Canal Radial Gate & Mtr

Qty	Item	Description	Rate	Total
1	Misc-Parts only	RADIAL GATE REMOTE CONTROL Includes Controller, PLC, and associated equipment for remote control of gate.	15,000.00	15,000.00
1	Misc-Parts only	MACE FLOWMETER Includes Mace Meter, Velocity Module, Comm Module, Velocity Sensor, Level Sensor, and mounting equipment	7,201.61	7,201.61
1	Misc-Parts only	ELECTRICAL POWER & MATERIAL Includes conduit, wiring, fittings, connectors, enclosure, and misc. construction material	2,666.60	2,666.60
1	Misc-Parts only	COMMUNICATIONS Includes Data Radio, Antenna, Coax, Polyphaser, and Mast	1,348.51	1,348.51
1	Misc-Parts only	LABOR Includes installation, configuration, calibration, and testing of system	9,395.00	9,395.00

Subtotal	$35,611.72
Sales Tax (0.0%)	$0.00
Total	$35,611.72

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P.O. Box 271446
Corpus Christi, TX 78427
Phone: 361-857-8446
Fax: 361-857-8451

Estimate

Date	Estimate #
4/24/2012	816C

Name / Address
United Irrigation District PO 877 Mission, TX 78573 Attn: Mike Warshak

Rep	Project
	Second Lift Station

Estimate Valid for 30 Days

Qty	Item	Description	Rate	Total
1	Misc-Parts only	MACE FLOWMETER (Four Meters) Includes Mace Meter, 4 Velocity Module, Comm Module, 4 Velocity Insert 2", and mounting equipment	12,342.24	12,342.24
1	Misc-Parts only	SOLAR POWER SYSTEM Includes solar panel, battery, enclosure, voltage regulator, wiring, etc.	5,046.80	5,046.80
1	Misc-Parts only	POWER SYSTEM Includes Power Supply, Enclosure, terminals, wiring, fittings, and connectors	711.43	711.43
1	Misc-Parts only	COMMUNICATIONS Includes Data Radio, Antenna, Coax, Polyphaser, and Mast	1,348.51	1,348.51
	Misc-Parts only	LABOR Includes installation, configuration, calibration, and testing of system	9,053.90	9,053.90

Subtotal	$28,502.88
Sales Tax (8.25%)	$0.00
Total	$28,502.88

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Corpus Christi, TX 78427
Phone: 361-857-8446
Fax: 361-857-8451

Estimate

Date	Estimate #
4/24/2012	815C

Name / Address
United Irrigation District PO 877 Mission, TX 78573 Attn: Mike Warshak

Rep	Project
	Third Lift Station

Estimate Valid for 30 Days

Qty	Item	Description	Rate	Total
	Misc-Parts only	MACE FLOWMETER Includes Mace Meter, Velocity Module, Comm Module, Velocity Insert 2", and mounting equipment	5,148.10	5,148.10
1	Misc-Parts only	SOLAR POWER SYSTEM Includes solar panel, battery, enclosure, voltage regulator, wiring, etc.	5,046.80	5,046.80
1	Misc-Parts only	POWER SYSTEM Includes power supply, enclosure, terminals, wiring, fittings, and connectors	711.43	711.43
1	Misc-Parts only	COMMUNICATIONS Includes Data Radio, antenna, coax, polyphaser, and mast	1,348.51	1,348.51
1	Misc-Parts only	LABOR Includes installation, configuration, calibration, and testing of system	7,903.90	7,903.90

Subtotal	$20,158.74
Sales Tax (8.25%)	$0.00
Total	$20,158.74

202-001

10 NOV 2011, 09:00

Spoke with Kenny Pipitone, of the Insituform Houston office. Based on the length and size of two 150' long runs of 48" RCP with 45 degree bends, the distance needed to be travelled, and that epoxy resin would need to be used since it will go to agricultural and municipal water, the estimate for the total project would be approximately $200,000.

-Dustin Moore, EIT

Kenny Pipitone
Insituform
281-898-0635