

**Annual Progress Report**  
**For the**  
**Texas Water Development Board**

**A**griculture Water Conservation  
**D**emonstration  
**I**nitiative



Harlingen Irrigation District CC 1

Maximization of On-Farm Surface Water Use Efficiency by  
Integration of On-Farm Application and District Delivery Systems

Submitted by:  
Harlingen Irrigation District  
Cameron County #1  
Wayne Halbert General Manager  
Harlingen, TX

February 28<sup>th</sup>, 2006

---

Harlingen Irrigation District

## Table of Contents

1. Executive Summary.....	1
1.1. Advisory Committee Members .....	1
2. Introduction .....	2
3. Scope of Work .....	2
3.1. Subcontracting Contract Execution .....	2
3.2. District and On-Farm Flow Meter Calibration and Demonstration Facilities.....	2
3.3. District Dispatch and Irrigation Delivery Scheduling .....	2
3.4. On-Farm Flow Measurement Data Collection .....	3
3.5. District Facilities and Policies Required to Support.....	
On-Farm Water Conservation .....	3
3.6. Economic Evaluation of Demonstrated Technologies .....	3
3.7. Demonstration of Internet Based Information Real-Time Flow, Weather, and Water User Accounting System .....	3
3.8. Drip and Furrow Flood Irrigation in Annual Crops and Multi Year Crops .....	3
3.9. Surge, Automated Surface, and Precision Surface Irrigation.....	4
3.10. LESA/LPIC/LEPA Center Pivot Sprinkler Demonstration Sites.....	5
3.11. Automated and Manual On-Farm Measurements Systems .....	5
3.12. Variable Speed Pump Control and Optimization of Delivery of On-Farm Demands.....	6
3.13. Field Demonstrations of Projects/ Field Days.....	6
3.14. Workshops .....	6
3.15. Presentations at Water Conservation Meetings .....	6
3.16. Quarterly Progress Report .....	7
3.17. Program Administrative Work .....	7
3.18. Report Preparation, Reproduction, and Distribution.....	7
4. Financial Report by Task.....	8

## Appendices

- Appendix A Delta Lake Irrigation District Annual Report
- Appendix B Texas Cooperative Extension FARM Assist Annual Report
- Appendix C Texas A&M University – Kingsville Annual Report
- Appendix D Harlingen Irrigation Demonstration Sites Report
- Appendix E Harlingen Irrigation District Meter Calibration Facility Report
- Appendix F Axiom – Blair Engineering Annual Report

## 1. Executive Summary

The Harlingen Irrigation District-Cameron County No. 1, under the auspices of a grant from the Texas Water Development Board, is sponsoring the *Agricultural Water Conservation Demonstration Initiative (ADI)*, a multi-year project to conduct a study of the maximization of on-farm surface water use efficiency by integration of on-farm application and district delivery systems. The ten-year project includes participation by Harlingen Irrigation District Cameron County No. 1, Delta Lake Irrigation District, Texas A & M University-Kingsville, USDA-Natural Resources Conservation Service, Rio Farms, Inc, Texas Cooperative Extension Service and agricultural producers in Cameron, Hidalgo and Willacy counties. This Project proposes to assist in the implementation of the agricultural water conservation management strategies, as identified in the Region M Approved Regional Water Plan and the Texas State Water Plan and will further agricultural water conservation in Texas. The project supplements on-going conservation efforts in the Lower Rio Grande Valley

The District has formed an advisory committee consisting of growers, demonstration co-operators, scientists and representatives of grower organizations. The primary responsibilities of this committee are to offer guidance and perspective to the project as a whole. The committee meets on a quarterly basis to discuss the progress and goals of the project. Our hopes are for this committee to become one of the main conduits for disseminating information to the growers of the Rio Grande Valley.

### 1.1. Advisory Committee Members

Chris Allen – Cooperator  
Leonard Simmons – Cooperator  
Edward Bauer – Grower  
Sam Ruiz – Cooperator  
Tom Wetegrove – Grower  
Sam Morrow – Cooperator  
Dale Murden – Rio Farms General Manager  
Troy Allen – Delta Lake Irrigation District Manager  
Ray Prewitt – Texas Citrus Mutual  
Dr.. Shad Nelson – Texas A&M Kingsville  
Dr. Juan Enciso – Texas A&M Extension Service  
Dr. Al Blair – Axiom-Blair Engineering  
Dr. Steven Klose – Texas Cooperative Extension  
Terry Lockamy – Texas Cooperative Extension  
Phillip Stewart – NRCS  
Andy Garza – TSSWCB

## **2. Introduction**

This report contains the annual update and progress made in the Agricultural Demonstration Initiative Project as indicated in the Scope of Work of the Contract between Harlingen Irrigation District – Cameron County No. 1 (HIDCC1 or the District) and the Texas Water Development Board (TWDB). A description of the overall progress, problems encountered, delays in the timely completion of work, or change in the deliverables or objectives of the contract are discussed; as well as any corrective actions necessary.

## **3. Scope of Work**

### **3.1. Subcontracting Contract Execution**

The primary responsibilities for this task were contracted to Axiom-Blair Engineering. The subcontracts with Delta Lake Irrigation District, Texas A&M University Kingsville, Texas Cooperative Extension, and others to provide support and services to perform the work tasks listed below were completed for 2005 and all work for the reissue of those contracts for 2006 has been completed.

### **3.2. District and On-Farm Flow Meter Calibration and Demonstration Facilities**

The design and engineering of the Meter Calibration facility has been completed. The necessary permits for construction have been obtained, including a Section 10 Permit from the US Army Corps of Engineers for erosion protection for the return flow outlets. Contracts for the electrical, plumbing and slab labor have been negotiated and the District is waiting for final review and permission to proceed from the TWDB. The District has purchased a 12,000 gpm diesel engine driven pump to supply calibration water to the facility. The pump is installed in an existing pump house located adjacent to the meter calibration facility site. Intake and discharge piping is in place and the construction of the water diversion box is expected to begin in early March. The Prefabricated metal building has been ordered and the erection of this building will begin upon completion of the slab, which is scheduled for mid April 2006. Appendix “E” contains a more detailed account of the installation activity.

The District contracted the engineering and design for this facility to Axiom-Blair Engineering and a more detailed report of this contract is located in appendix “F”.

### **3.3. District Dispatch and Irrigation Delivery Scheduling**

This task is scheduled to begin in 2006

### **3.4. On-Farm Flow Measurement Data Collection**

Delta Lake Irrigation District has been contracted to perform the task of manual meter information collection. A detailed account of the collection methods and data is located in appendix “A”. This information will be compared with the Harlingen Irrigation District’s automated meter and telemetry system. The telemetry system to monitor deliveries of irrigation water through out the District is scheduled to be complete in late 2006. We will begin the comparison after the District has had ample time to evaluate its system and is confident in the data it provides.

### **3.5. District Facilities and Policies Required to Support On-Farm Water Conservation**

This task scheduled to begin in 2006.

### **3.6. Economic Evaluation of Demonstrated Technologies**

A significant component of the demonstration project is the economic evaluation of each on farm technology. The District contracted Texas Cooperative Extension service to perform this task through its FARM Assist program. A more detailed report of the first year’s evaluation, as submitted by Dr. Steven Klose, is located in appendix “B”.

### **3.7. Demonstration of Internet Based Information Real-Time Flow, Weather, and Water User Accounting System**

The bulk of this task is being performed by Axiom-Blair Engineering. The design and launch of the District’s web page occurred in September – October of 2005. The web page allows us to publish information regarding demonstration sites as well as weather and irrigation water usage. A more detailed report of this task, as submitted by Axiom-Blair, is located in appendix “F”.

### **3.8. Drip and Furrow Flood Irrigation in Annual Crops and Multi Year Crops**

The majority of this task has been subcontracted to Texas A&M University - Kingsville under the direction of Dr. Shad Nelson. Dr. Nelson and his staff have been working since last spring to establish demonstration sites throughout the Valley. He has also been working closely with Texas A&M Extension Service and Dr. Juan Enciso. Dr. Nelson has been sharing resources and gathering data on sites established by Dr. Enciso. A more detailed report of this task, as submitted by Dr. Shad Nelson, is located in appendix “C”.

### **3.9. Surge, Automated Surface, and Precision Surface Irrigation**

The District has maintained three surge demonstration sites through out the 2005 growing season. Two of these sites will continue through the 2006 growing season.

The first demonstration is in a 35 acre sugarcane field where a P&R surge valve is used, along with a fertigation pump and controller. The applied water is measured with a McCrometer insertion meter installed at the field turnout. This demonstration will show the efficiencies of surge irrigation combined with fertigation, compared to traditional flood irrigation combined with fertigation. Soil samples will be taken before and after the fertigation event to compare the distribution of fertilizer in both field segments. This field is fourth ratoon sugarcane and is being grown using minimum till conservation practices. Due to the age of the crop this demonstration will be terminated after this growing season.

The second demonstration is in a 40 acre cotton field where a Waterman surge valve is used. The applied water is measured with a ten inch McCrometer saddle meter. This demonstration will show the efficiencies of surge irrigation compared to flood. The cotton is planted on sixty inch beds, with three lines of cotton planted on fifteen inch spacing across each bed. This field is grown using minimum till conservation practices. For the 2006 growing season this field will be planted in cotton.

The third demonstration is in a 38 acre field planted in fall corn. The P&R surge valve was used on the west half of the field and traditional furrow irrigation with Poly Pipe was utilized in the east half. A McCrometer insertion meter was used to measure the furrow side and a 10” McCrometer meter in aluminum pipe was used in the surge half. The corn was planted on 40 inch beds and grown using conventional tillage. In 2006 this field will be planted in cotton and an experimental surge valve developed by Harlingen Irrigation District will be used to apply irrigation water.

Along with surge irrigation ADI has been demonstrating flood irrigation in three different fields using three different methods.

The first demonstration is a small hay field planted in Coastal Bermuda. This field is irrigated using flood irrigation and an open permanent ditch. The water is metered with a Semetrics meter installed permanently at the turnout.

The second demonstration is a 37 acre Sugarcane field planted in the fall of 2005. The irrigation water is monitored with McCrometer insertion meters at each turn out and applied to the furrow through Poly pipe. This site is expected to remain in sugarcane for five years.

The third demonstration site is a seven acre vegetable field planted in the fall of 2005. This field is furrow irrigated with gated aluminum pipe. The water is metered with a McCrometer meter in line with the pipe. This site will be planted in corn in the spring of 2006 and flood irrigated in pans. The drain water from one pan will be used to irrigate the second pan. This site is expected to continue for several years with furrow irrigation in the fall and pan irrigation in the spring.

A more detailed report of the surge and flood irrigation sites under the control of the District is located in appendix “D”.

### **3.10. LESA/LPIC/LEPA Center Pivot Sprinkler Demonstration Sites**

The District has two LESA center pivot sites. The first site is located at Rio Farms and has been in a spring cotton, fall corn rotation for several years. Soil moisture is monitored during each of the growing seasons and irrigation water is measured with a McCrometer meter located on the center pivot. This site is scheduled to be planted in soybeans in the 2006 spring season.

The second site is a pasture irrigated with a mini-pivot. This pasture is divided into four separate pastures and the mini pivot is moved to each section for the duration of the irrigation. We monitor moisture in each pasture and the water is metered at the pumping site with a McCrometer meter. This pasture is used for a cow calf operation. We expect to monitor this site for the duration of the project.

A more detailed report of the LESA/LEPA sites is located in appendix “D”.

### **3.11. Automated and Manual On-Farm Measurements Systems**

The District is in the process of installing a multi-million dollar automated meter and telemetry system that will allow for the monitoring and reporting of all water deliveries in the District. Upon completion of this installation in late 2006 the District will begin monitoring and reporting flows for evaluation purposes. Real time flow data will be made available to growers on the District’s web site. The cost and efficacy of the automated collection of flow data within the District will be compared to the manual collection taking place in the Delta Lake Irrigation District. This evaluation is expected to take place over several years and the results of this evaluation are not expected to be available until the evaluation process is complete.

### **3.12. Variable Speed Pump Control and Optimization of Delivery of On-Farm Demands**

Delta Lake Irrigation District has installed three diesel driven pumps to supply water to a service canal. As part of their revised 2006 contract, Delta Lake Irrigation District will provide the hardware and Harlingen Irrigation District has contracted Axiom-Blair to provide engineering and design for the variable speed and control component of this project. This task is scheduled to begin in the spring of 2006 and be completed by the summer of 2006.

### **3.13. Field Demonstrations of Projects/ Field Days**

Field demonstrations will begin in 2006. We did not feel there was enough data to support any field demonstrations during this first year of operations. Our first field day is scheduled for June 2006. This field day will coincide with a visit from the project coordinators from Texas Tech and the advisory committee from The Texas Alliance for Water Conservation.

### **3.14. Workshops**

The District has scheduled two workshops for early 2006. The first on February 21<sup>st</sup> is an introduction to an irrigation management model developed by the Blacklands Research Center in Temple Texas. This workshop will introduce local growers to the model for evaluation purposes and give the District an opportunity to evaluate the efficacy of this tool. The second workshop will be held on March 7<sup>th</sup>. This workshop is a short course on the EPANET hydraulic simulation model for design of irrigation pipeline and pumping plants. The course covers an introduction to pipeline and pump hydraulics and hands-on use of the EPANET software. The course is applicable to irrigated farm managers, surface irrigation district employees, and other users and purchasers of irrigation pipeline and pumping plants.

### **3.15. Presentations at Water Conservation Meetings**

During the past year we have had the opportunity to speak at several water conservation meetings. The first of which was the Valley Water Summit. At this meeting Wayne Halbert, General Manager for Harlingen Irrigation District, presented an overview of this project during one of the breakout sessions. Project presentations were made by Tom McLemore at the Texas Citrus Association and the Texas Vegetable Association annual meetings. Mr. McLemore the ADI Project Manager has worked in conjunction with Texas Citrus Association to make project presentations at local EQIP information meetings.

## Agricultural Water Conservation Demonstration Initiative – Annual Progress Report

The District has published three news letters highlighting the Agricultural Water Conservation Demonstration Initiative and related topics. This news letter has been distributed to over seven hundred recipients across the state of Texas. Our goal is to publish the newsletter on a quarterly basis and use it as one of the conduits for disseminating information to the growers of the Rio Grande Valley as well as other interested parties across the state.

A fact sheet was created to introduce the ADI project to growers and agriculture leaders. This fact sheet was distributed at water conservation meetings, gins and irrigation districts.

Tom McLemore is scheduled to speak at the Texas Water Conservation Association annual meeting along with Dr. Vivien Allen of Texas Tech University. He will be giving a presentation on the Agricultural Water Conservation Demonstration Initiative and its impact on water conservation in the valley.

### **3.16. Quarterly Progress Report**

Harlingen Irrigation District has completed and filed three quarterly progress reports.

### **3.17. Program Administrative Work**

Harlingen Irrigation District hired a full time secretary/bookkeeper to maintain the accounting records and files for the ADI project. The project's primary administration is handled by Tom McLemore the Project Manager. Together, along with the Irrigation District's General Manger Wayne Halbert, we have issued and maintained subcontracts with Texas A&M University - Kingsville, Delta Lake Irrigation District, Texas Cooperative Extension and Axiom-Blair Engineering. The work involved in reissuing these contracts for 2006 has been completed and the draft contracts delivered to the proper authorities for their review and acceptance.

### **3.18. Report Preparation, Reproduction, and Distribution**

The district has completed and filed three quarterly progress reports and the respective reimbursement request. The District has also completed their first annual report, reproduced and filed it with the Texas Water Development Board.

#### 4. Financial Report by Task

TASK	TWDB Feb 1, '05 Feb 15, 06	Matching Funds			Source
		2003	2004	2005	
<b>A- Project Subcontracting</b>					
Subcontracting Contract Execution	\$6,710.00				
<b>Total A- Project Subcontracting</b>	<b>\$6,710.00</b>				
<b>B-Technical Management Support for Demos</b>					
District and On-Farm Flow Meter Cal	\$143,528.71			\$20,000.00	HID
		\$123,608.59	\$175,842.95	\$329,769.34	HID
				\$233,814.73	BOR
On-Farm Flow Meas. Data Collection	\$9,990.62		\$376,981.31	\$17,254.62	NADB
Dist Facilities and Policies	\$116.26				
Economic Eval of Demo Tech FARM ASSIST	\$1,656.21				
Technical Management Support for Demos -Admin	\$26,664.82				
<b>Total B-Technical Management Support for Demos</b>	<b>\$181,956.62</b>	<b>\$123,608.59</b>	<b>\$552,824.26</b>	<b>\$600,838.69</b>	
<b>C-Demonstration Projects</b>					
Demo of Internet Based Information	\$14,862.15			\$3,323.00	ABE
				\$2,249.32	HID
				\$5,283.00	EQIP
On Farm Drip,Flood,and Surge Demo	\$44,298.78			\$24,095.00	TAMUK
Demonstration Projects - Admin	\$19,822.96				
<b>Total C-Demonstration Projects</b>	<b>\$78,983.89</b>			<b>\$34,950.32</b>	
<b>D- Public Field Days and Demonstrations</b>					
Presentations at Water Con. Meetings	\$3,161.97				
<b>Total D- Public Field Days and Demonstrations</b>	<b>\$3,161.97</b>				
<b>E-Project Administration and Report Prep</b>				\$125,391.00	HID
Program Administrative Work	\$57,710.25				
Report Prep. Repro. and Distribution	\$3,021.58				
Project Administration and Report Prep - Other	\$16,287.98				
<b>Total E-Project Administration and Report Prep</b>	<b>\$77,019.81</b>			<b>\$125,391.00</b>	
<b>Sub total TWDB</b>	<b>\$347,832.29</b>	<b>\$123,608.59</b>	<b>\$552,824.26</b>	<b>\$761,180.01</b>	
<b>Sub total Matching Funds</b>	<b>\$1,437,612.86</b>				
<b>To Date Project Cost</b>	<b>\$1,785,445.15</b>				