

Delta Lake Irrigation District Canal Automation Project

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Introduction

The Rio Grande region is one of the fastest growing areas in Texas, and the water demand of municipalities and industries is also rapidly increasing. Recent droughts have also raised real concerns about the viability of the limited water supply of the Rio Grande River. Water to meet the increasing demand must come from agriculture which holds 90% of all the water rights in the basin. A state-mandated regional water resources planning effort is currently underway which includes a detailed analysis of the current conveyance efficiencies of the districts. Planners are attempting to determine how much water could be freed up for other users through improvements in the districts and with on-farm irrigation.

Texas Water Development Board (TWDB) developed the Rio Grande Regional Water Planning Group for Maverick, Webb, Zapata, Jim Hogg, Starr, Hidalgo, Willacy, and Cameron counties (also known as "Region M") to coordinate long-range water supply planning by bringing together stakeholders representing a variety of interests (Figure 1).



Figure 1. Texas Regional Water Planning Groups

The Rio Grande region faces significant water needs over the next 50 years. Population growth and an aging irrigation infrastructure will combine to produce a deficit of nearly 600,000 acre-feet of water by the year 2060 (Figure 2) ... unless specific water supply and management strategies are implemented. Local buy-in and action are needed to implement several of the water supply strategies; for many, funding sources must be identified. Others require additional in-depth evaluation. 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 (TWDB, 2001).



Figure 2. Regional Water Demand

The Lower Rio Grande Valley (LRGV) is located at the Southeast tip of Texas. The Region has approximately 740,000 irrigated acres and uses 1 to 1.4 million ac-ft of water a year to grow a wide range of fruit, vegetable and field crops. Just across the border in Mexico is a similar irrigated region containing about 1 million ac. All the water used in the region comes from the Rio Grande River which is divided between Texas and Mexico as stipulated by international treaty.

There are 28 irrigation districts in Hidalgo, Cameron and Willacy Counties in LRGV (Figure 3). These districts hold combined agricultural water rights totaling 1,468,314 ac-ft. The water right at the smallest districts is 625 ac-ft and 174,776 ac-ft at the largest district. The largest eight districts account for 69% of the total water rights and Delta Lake Irrigation District holds the largest right supplying water to Hidalgo and Willacy Counties (Fipps, 2005).

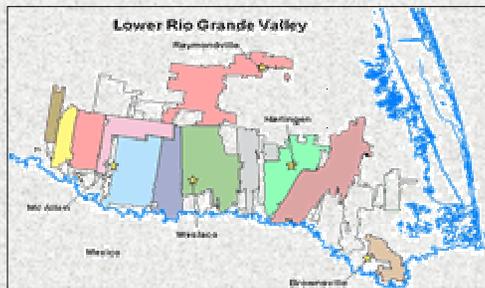


Figure 3. Irrigation Districts of the Rio Grande Valley of Texas

Delta Lake Irrigation District

District was established on June 22, 1914 as a political subdivision of the State of Texas. The District provides irrigation, drainage and water supply functions to 148.95 square miles of Hidalgo and Willacy Counties. The Rio Grande is the only water source for the District. All of the water diverted by the District, from the Rio Grande, originates as surface water released by the International Boundary and Water Commission from Falcon Reservoir.

The District's water distribution network consists of 250 miles of lined or partially lined canals, 42 miles of unlined canal and 122 miles of unlined laterals (Figure 4). The most of the conveyance system is very old high efforts in operation and maintenance. The lack of modern, reliable water flow information and communications systems make management and operational decisions difficult.

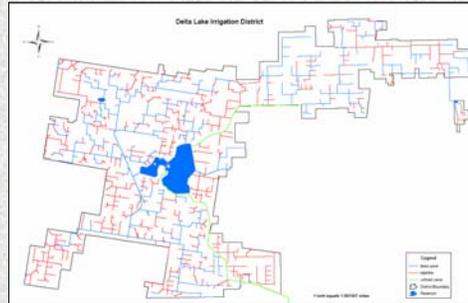


Figure 4. Delta Lake Irrigation System water distribution network

District's A System Canal was selected to conduct the Project (Figure 5). This canal is fed from West Reservoir by Main Relief Pump Station.

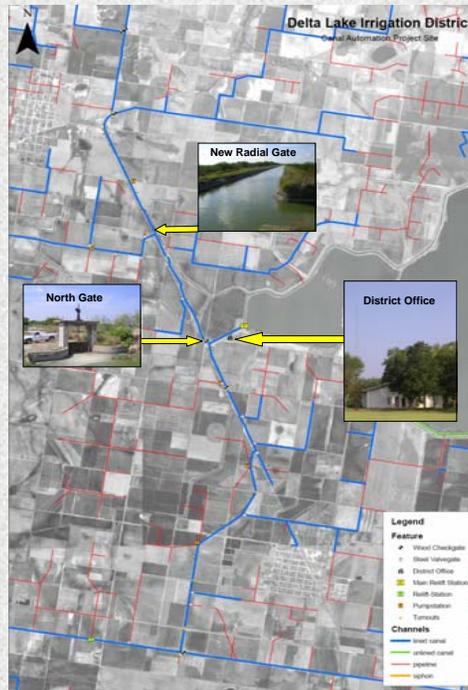


Figure 5. Canal automation project site map

Project Plan

The main goal of the project is to demonstrate SCADA system by equipping the sites with automatic control and telemetry systems through the following:

- Implementation of automatic and remote control of the north gate. Since, the gate structure is very old, it must be replaced. Solar panel system will provide electric power. In addition, flow downstream of the north gate will be monitored remotely.
- Implementation of automatic and remote control of a new radial gate. The new radial gate will be installed. Solar panel system will provide electric power.
- Implementation of telemetry system via spread spectrum radio from all three locations.
- Evaluate existing Human Machine Interface (HMI) software and make modification as needed in order to collect data from remote sources and display the status information in graphics, tables, trends, and reports that system users and operators can easily understand.



Figure 6. This very old north gate structure will be equipped with SCADA equipment and will be controlled from District office.



Figure 7. A new radial gate will be installed with SCADA equipment and will be controlled from District office.



Figure 8. District office will serve as control center of a new SCADA system

Expected Results

Engineers at Texas Cooperative Extension expect that implementation of SCADA system at Delta Lake Irrigation District will have the following results:

- An improvement in water use efficiency, allowing increasing water conservation and agricultural production in irrigated areas and/or a reduction in pumping costs.
- Improvements in water supply and distribution control will facilitate increasing demand in the other sectors.
- Improvements to data management and record keeping (such as computerized flow calculations and computer databases) will facilitate delivery scheduling, as well as planning for ongoing maintenance and future rehabilitation programs.
- Finally, Delta Lake Irrigation District canal automation project will serve as a model for replication of similar projects around the Lower Rio Grande Valley.

