United Irrigation District

Gate Automation & Telemetry Project

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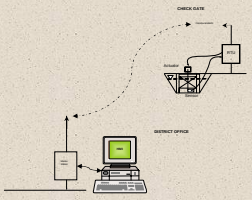
United Irrigation District and the Irrigation District Engineering and Assistance Team (IDEA) of Texas A&M University have been working together to establish canal automation and telemetry capabilities. This is a cost-share program to demonstrate the benefits of automatic gate control, telemetry for remote monitoring, and to determine the equipment and software that works best for the conditions of the Rio Grande Valley. The IDEA Team is covering the costs of the telemetry and automation equipment (including software), and the district is being required to cover the costs on such items as the motors and actuators needed to operate the gates.

The implementation of automation and telemetry systems can result in more efficient water management and other benefits including:

- Real-time flow control and measurement
- Reduced operation and maintenance costs
- Reduced spillage and seepage
- Peak demand management
- Better customer service with added flexibility
- Operational analysis
- Alarming capability



Steps of Implementation:

• Define Goals and Objectives

Identify the current needs but also will be able expand for future growth. Understand and determine the types of canal operation and control concepts that could be implemented. Develop a master plan defining short-term and long-term improvements that includes site selections, equipment selection, and the time-line or implementation process.

• Site Selection

Site selection is one of the main steps to implement the project in districts. During the selection one should note that the control structure at the site is operated frequently to make automation feasible. If the structure is not frequent or critical, automation may not be economically feasible. In addition, the followings should be considered for site selection:

- Vandalism
- Accessibility for maintenance
- Availability of power supply (solar/electric)

Figure 1. Bryan Canal Head Gates

The District's Bryan Canal (with capacity 225 cfs) was selected to implement canal automation project. The structure consists of three manually controlled sluice gates, out of which only two in used for flow control. This site was an ideal location for using a control structure for flow measurement, having suggested approach conditions: 100 ft (10 x canal width) straight and unchanging canal section that help produce smooth flows.

Askar measures the maximum flow of the old control structure with a propeller meter

• Determine Flow Rate

After studying the system upstream and downstream of the site and how they operate in conjunction with the proposed automation site determine the minimum and maximum operational flow rates to the section. If the district is uncertain, plan to take flow measurements. Of course this should be done anyways.

• Selection of Control Feature (i.e. Type of Gate): Some types of structures work better in specific situations (so know the pros and cons). The current sluice gate setup would be more difficult to automate when dealing with operating three gates and the structure doesn't provide adequate flow uniformity for flow measurement. The new radial gate requires less energy and less equipment needed for operation, and provides for a more smooth, uniform flow.

• Design of Control Structure: Follow engineering guidelines and/or work with an engineer. Location of the structure is part of the design.

• Determine the type of SCADA Equipment Components

• Determine equipment vendors, costs, pro & cons of each type of equipment

• Finalize costs and seek approval: Costs can change as due to unforeseen problems, or material costs, and design/equipment changes or requirements. District managers will need to get approval before they spend.

• Ordering & Receiving Equipment: This may take time when working with vendors to write equipment specs, payment hassles, receiving the wrong item, etc.

The new Radial gate was delivered

• Construction of new control structure or modification of existing control structure: Gathering machinery and personnel, concrete truck arriving time, weather interference, etc.

Constructing the new control structure

The new control structure is ready for the new radial gate

• Making projects adjustments and modifications: More problems can arising that may require changes.

• Installing gate and components

Installing the new gate

Installing and testing the new actuator

• Calibrating the gate

• Installing, programming, fine tuning the SCADA equipment.

Azim start the process of programming the RTU and SCADA equipment

Engineers at Texas Cooperative Extension expect that implementation of SCADA system at United 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.
- Finally, United Irrigation District canal automation project will serve as a model for replication of similar projects around the Lower Rio Grande Valley.