

City of Carrollton Fyke Road Lift Station Reconstruction



American Public Works Association—Texas Chapter



**Public Works
Project of the Year
Nomination**

May 2012

Executive Summary

The Fyke Road Lift Station Reconstruction project was relatively small but eliminated a chronic operational problem for the City's wastewater department. The Lift Station was constructed in 1979 and was of the wet well/dry well type, and since it was about 25 feet deep, required a confined space entry.

The old Lift Station wet well and pumps were improperly sized by today's design criteria – the wet well was too small and the pumps too big – and as a result the wet weather wastewater flows were pumped into the receiving manhole too quickly and often for it to handle the flows. As a result, wet weather overflows were common in the receiving manhole and the Lift Station had to be monitored in large rainfall events because it was always in danger of losing power or malfunctioning. This project corrected those major flaws and should serve the area for decades.

The project was constructed with Pay As You Go funding which is derived from residents' water utility bills. Birkhoff, Hendricks & Carter, L.L.P. provided professional engineering services while North Texas Construction constructed the project.

The project began in October 2010 and took a year to construct, though actual construction did not take that long. Delays in coordinating with the electrical provider took several months in converting from 240V to 480V and then delivery problems for various components also caused delays. The original bid cost of the project was \$632,200.

In total, the project consisted of the design and construction of the following components:

- Lift Station Construction
- On site Sanitary Sewer and Force Main
- Backup Power Generation
- Demolition and Removal of the old Lift Station
- Traffic Control
- Erosion Control
- Prior to construction, property acquisition from an adjoining resident

The total project cost was approximately \$659,600, 4.33% over the original bid price. The increased cost was due to making some sewer system modifications at the discharge end of the force main and some pump equipment upgrades.

Project Category

Project Name: City of Carrollton Fyke Road Lift Station Reconstruction

Division: Projects less than \$2 million

Category: Environmental

Construction Period: October 2010 to November 2011

Background

Wastewater collection system rehabilitation in Carrollton prior to 2004 was minimal and except for problems that required immediate attention, most attention was directed at water system maintenance and improvements. In 2004, an annual program was initiated to correct the City's problem wastewater lines, which at the time totaled over 48,000 linear feet (LF). Specific problem areas ranged in length from 120 to 3,000 LF, and one even approached 8,000 LF. In order to prevent overflows from blockages and grease, these lines required cleaning every fifteen to thirty days which was costly to maintain. After 2004, annual contracts located in specific areas of the City were implemented while

others were to be eliminated with future road reconstruction projects. Most had been taken care of by 2009 at which time Lift Stations would be addressed.

The Fyke Road Lift Station was easily identified as the first project to be undertaken. The Lift Station had routine electrical problems and had to be closely monitored during heavy rains due to wet weather inflow problems in the collection area. However, since 2001, about 85% of the 36,000 LF basin that it serves had been replaced with new PVC lines in subdivision rebuild projects, so inflow had been greatly reduced. Also, a wastewater flow study had been performed in 2007 so actual flow rates were known. As a result the station's pumps could be reduced from 200 gpm to 100 gpm and the wet well could be sized using current design criteria. Public Works was leery of the proposed reduction in pump capacity, so a 3-pump station was designed which would provide some flexibility.

Power failures were all too common at the Lift Station at the most critical times, so in accordance with current design criteria, a backup generator was also part of the new station. This was a key project upgrade as the Lift Station's flows could

not be handled by mobile vactor trucks when it was needed and on multiple occasions the City had to obtain approval to pump wastewater into the neighboring City's system to avoid sanitary sewer overflows and subsequent enforcement action. Needless to say, the 1970's electrical controls were also a source of irritation because of increased maintenance and would be replaced with state of the art electronics.

The old Lift Station was located on a residential piece of land in an easement which had no ingress or egress attached to it; the City had just basically assumed ownership of a piece of land approximately four times the size of the easement. In order to make things right, the City purchased the track of land from the current resident which enabled the new Lift Station to be constructed next to the old one. With that, the new Lift Station could be constructed and service could be transferred from the old to the new with minimal down time.

The project was constructed with Pay As You Go funding which is derived from residents' water bills. Birkhoff, Hendricks & Carter, L.L.P. was selected to prepare the Plans and Specifications for the project while North Texas Construction constructed the project.

With its operational deficiencies, the Fyke Road Lift Station was the first of the City's Lift Stations recommended for rehabilitation by the Public Works Department.



Construction

Lift Station construction began in October 2010. Since the site was extremely tight, the first thing the contractor did was to make an agreement with the resident and former owner to use part of their back yard as a staging area. This involved removing their old fence and temporarily moving it back about 25 feet, enabling the construction of the new wet well and valve vault. Soon after, in January 2011, the pumps and other accessories were installed and sections of the new on-site lines were installed while working around the old station as much as they could. The electrical panel and components arrived on site in



Working around the old Lift Station and sewer lines was a constant challenge.



August with installation in September. Wiring and troubleshooting followed installation. During this time, coordination to energize the new station was ongoing. Since power was converting from 240V to 480V, new lines and a transformer had to be set. This activity was the most difficult in terms of progress as Oncor, the electric distributor and Gexa, the electric provider, had coordination issues.



There were two key change orders for the project. The Public Works Department requested that the discharge end of the force main where overflows previously occurred receive further analysis to more efficiently handle the requirement. As a result, a change order was initiated and two old brick manholes were removed and one 5 foot diameter manhole and 60 feet of force main was constructed which eliminated constriction problems in the collection system.

A minor change was incorporated at the end of the project that resulted in the planting of Xeriscape instead of sod throughout the site to promote water conservation as a Best Management Practice. Fortunately the City's Parks Department had recently removed some landscaping that was presenting visibility problems in a roadway median and they were used and leveraged to minimize costs. This change resulted in a greatly improved site appearance and minimal sustainable costs incurred.

New Lift Station electrical panel, pump control boxes and odor control unit

New Lift Station driveway and backup generator unit



The original schedule included 180 days to complete all work which would have put completion in the middle of April 2011. Manufacturing and franchise utility delays, which were beyond the control of the contractor, resulted in the completion being delayed until October 2011 but the project never impacted the operation.



Safety was a main concern in this project and no hours were lost during construction.

Environmental stewardship and concerns were addressed but were not major issues, as most of the work was contained within the existing site. Erosion control consisted of a silt fence around the perimeter of the site, good housekeeping and other construction best management practices.

Since the construction was mostly contained on site, community relations mostly consisted of coordination with the one resident.

The final outcome was an efficient Lift Station that can handle flow 24-7. This project with lessons learned will be the template for the balance of the Lift Stations needing upgrades.



New manhole at force main discharge

New electrical panel



New wet well & pump assemblies

Special Challenges

This project included several challenges, although every effort was made to minimize them before they could occur. These challenges included:

- Working in a small construction area and keeping an existing Lift Station in service while concurrently constructing the new one.
- Coordination between the electric deliverer and the electric provider. Although each was made aware of construction progress and the need for timely action, neither was able to deliver services in accordance with the original schedule.
- The switch from the old station to the new station had to be performed quickly to avoid sewer backups and overflows. Work was accomplished with no problems and no sanitary sewer overflows (SSOs).

What was right?

Although there were many challenges and problems to overcome, several positive things also occurred including:

- Replacement of an old Lift Station that was not reliable.
- Replacement of old sewer lines within the site and at the discharge end of the force main.
- Creation of a visually pleasing site with Xeriscape landscaping.

Post Construction

The new Lift Station has been in use for about four months now and has performed excellently in a couple of major rainfall episodes and maintenance has been reduced to just the routine site visits.

The black iron fence provides a more pleasing appearance than the typical chain link fence.

