City of Carrollton

Columbian Club Pump Station Rehabilitation

American Public Works Association–Texas Chapter

CARROLLTON
TEXAS

Where Connections Happen

Public Works Project of the Year Nomination

May 2011

Texas Chapter
Public Works Project of the Year (page 1)

2011 TPWA Awards Program Supporting Data Form

Please address each of the following areas in your supporting documentation, adhering to the belo w sequence when possible.

- **Completion date contained in contract. Any time extensions granted should be addressed in the submittal.**
- **Construction schedule, management, and control techniques used.**
- **Safety performance including number of loss-time injuries per 1,000 man-hours worked and overall safety program employed during the construction phase.**
- **Environmental considerations including special steps taken to preserve and protect the environment, endangered species, etc., during the construction phase.**
- **Community relations – a summary of the efforts by the agency, consultant and contractor to protect public lives and property, minimize public inconvenience, and improve relations.**
- **Unusual accomplishments under adverse conditions, including but not limited to, adverse weather, soil or site conditions, or other occurrences over which there was no control.**
- **Additional considerations you would like to bring to the attention of the project review panel such as innovations in technology and/or management applications during the project.**

NOTE: Supporting documentation is limited to twenty (20) pages, exclusive of photographs and nomination form. This submittal will not be returned. When possible, please provide original photographs (black and white or color), as photographs (black and white or color), as photographs will be used for promotional purposes by TPWA. Original submittal and all copies should include nomination form and supporting documentation. Four copies of submittal are required.

Nominated By **Marc Guy** **Assistant City Manager**
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Texas Chapter
Public Works Project of the Year (page 2)

2011 TPWA Awards Program Nomination Form

Deadline **May 1, 2011**

Project Name **City of Carrollton Columbian Club Pump Station Rehabilitation**

December 2010
Project Completion Date – Must be reported

Public Agency **City of Carrollton**

Project Category **[ ] Structures [ ] Transportation [X] Environment**

[ ] Historical Restoration/Preservation

[ ] Disaster or Emergency Construction//Repair

Project Cost: **[ ] Less than $2 million [X] $2-$10 million [ ] $10-$100 million**

[ ] Greater than $100 million

Managing Agency **Thomas Geier** **C.I.P. Manager**
Name **Title**

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Texas Chapter
Public Works Project of the Year (page 3)

Primary Consultant **John Birkhoff** **President**
Name **Title**

Birkhoff, Hendricks & Carter, LLP
Agency/Organization

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Dallas **TX** **75243**
City **State** **Zip-Postal Code**

(214) 361-7900 **(214) 361-0204** **jbirkhoff@bhcllp.com**
Phone **Fax** **E-mail**

Contractor: (1) **Don Cameron** **Area Manager**
Name **Title**

Preload, Inc.
Agency/Organization

60 Commerce Drive
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Hauppauge **NY** **11788**
City **State** **Zip-Postal Code**

(631) 231-8100 **(631) 231-8122** **dgc@preloadinc.com**
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Contractor: (2) **Zach Fusilier** **Project Manager**
Name **Title**

North Texas Contracting, Inc.
Agency/Organization

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Contractor: (3) **Paul Mendoza** **President**
Name **Title**

Mela Construction, Inc
Agency/Organization

430 Lakeview Road
Address (if post office box, include street address)

Rhome **TX** **76078**
City **State** **Zip-Postal Code**

(972) 347-5260 **(972) 347-5261** **paul@melacontracting.com**
Phone **Fax** **E-mail**

Contractor: (3) **Brandon Mellgren** **Project Manager**
Name **Title**

Crescent Constructors, Inc.
Agency/Organization

1100 Grinell Drive
Address (if post office box, include street address)

Richardson **TX** **75081**
City **State** **Zip-Postal Code**

(972) 783-6901 **(972) 437-2845** **brandon@crescentconstructors.com**
Phone **Fax** **E-mail**

Project Category

Project Name: City of Carrollton Columbian Club Pump Station Rehabilitation

Division: Projects between $2 million and $10 million

Category: Environmental

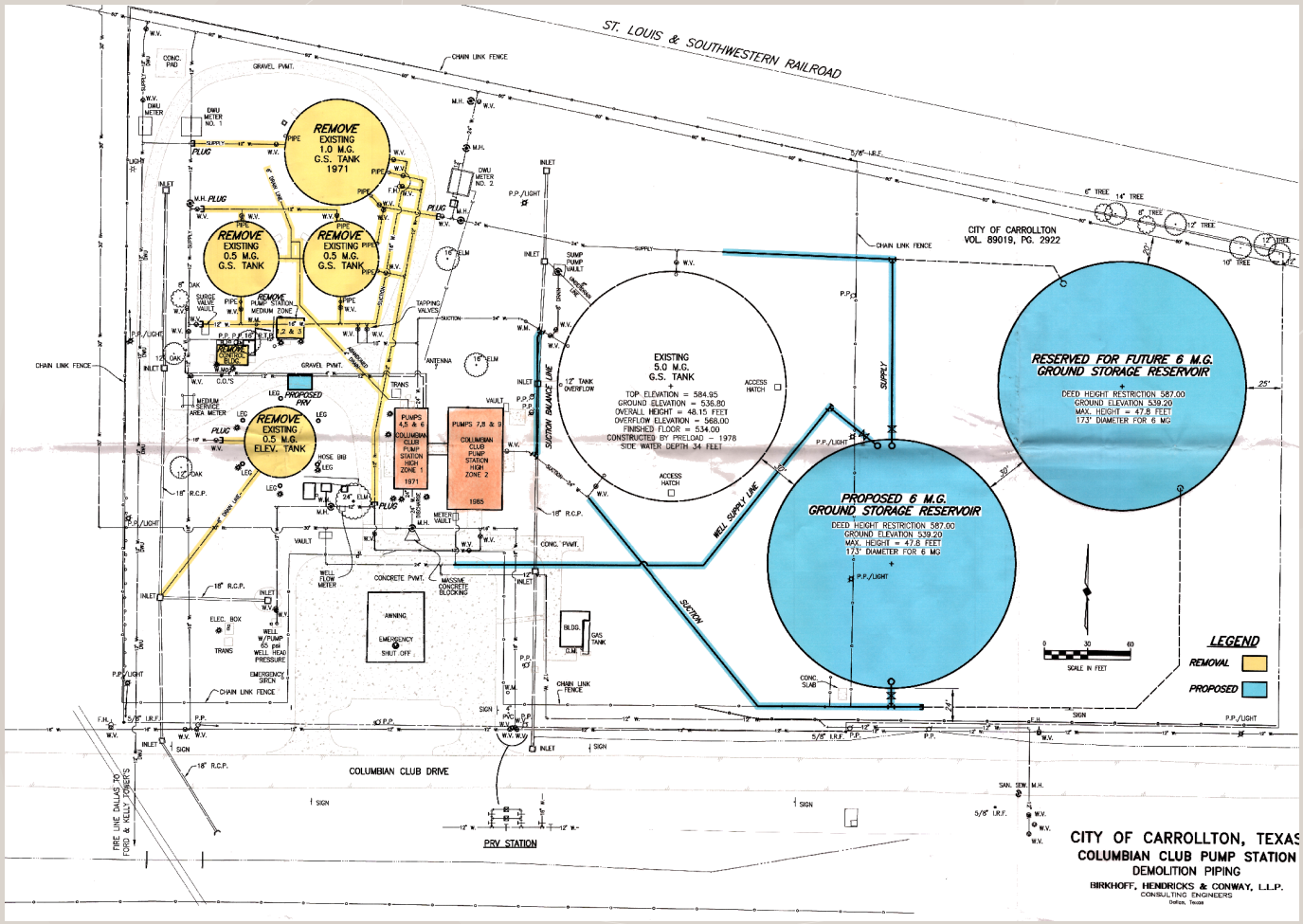
Construction Period: February 2004 to December 2010

Executive Summary

The Columbian Club Pump Station Rehabilitation project consisted of the rehabilitation of two pump station buildings, motor controls, site piping, construction of a six-million gallon ground storage tank and the removal of old storage tanks. The pump station receives water from a 60-inch Dallas Water Utilities' (DWU) line located in southeastern Carrollton.

The 2001 Water Master Plan Report identified several improvements required throughout the City to meet future demands and bring the water system up to TCEQ (Texas Commission on Environmental Quality) minimum standards. Several of the recommended master plan improvements were for the Columbian Club Pump Station which had been constructed over many years in several different projects. The proposed Master Plan improvements included the

Site Layout



removal of three existing steel ground storage tanks and an elevated tank, the construction of a new ground storage tank and water lines, and lastly, in accordance with TCEQ criteria, a standby pump for the remaining empty slot in the pump station. The improvements would ensure that the City could handle peak conditions as it reached buildout. As design progressed, other improvements were added to the work including the rehabilitation of the pump station structures, removal of two old motor control buildings and replacement of outdated Motor Control Centers and standby generators.

Birkhoff, Hendricks & Conway, LLP provided professional engineering services while construction was divided among four contractors: Preload, North Texas Contracting, Mela Contracting and Crescent Constructors.

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

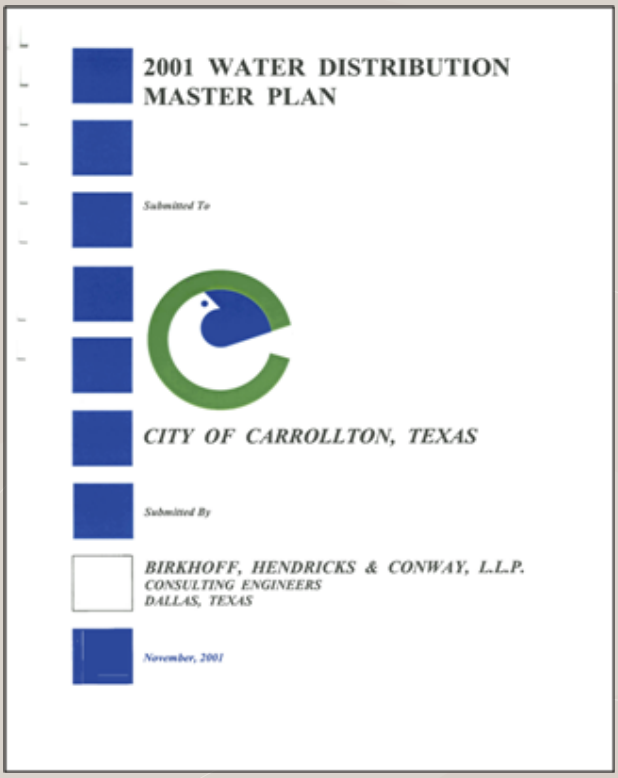
- Construction of a new 6 million gallon Ground Storage Tank
- Removal of 3 old steel Ground Storage Tanks and 1 Elevated Storage Tank
- Removal of 2 old brick control buildings
- Rehabilitation of the pump station structures, including the addition of a new Motor Control Room
- Installation of 3,400 LF of 16 to 36-inch RCCP Water Mains
- Installation of 2 Standby Generators
- Replacement of Electrical and Motor Control Equipment
- Erosion Control
- Coordination with Dallas Water Utilities and Oncor

The total project cost was about $6,300,000 which included $312,000 (4.96%) in change orders. The increased costs were mainly due to fixing problems that were unknown during the design phase and could not be determined until construction was underway. Other additions, like a new fence around the site, were made to ensure the long term sustainability of the facility and were in the City's plans to replace in the near future anyway. Thesite layout on page 2 shows facilities to be removed in yellow, those to be rehabbed in orange, and those to be constructed in blue.

Background

A professional services contract to update Carrollton's Water Distribution Master Plan was awarded in May 2000 to identify water system deficiencies and needed improvements to meet future demands (buildout conditions) and to ensure continued compliance with TCEQ (Texas Commission on Environmental Quality) standards. The results were presented in the 2001 Water Master Plan and Supplemental Report which identified many improvements over the entire City including the construction of a new ground storage tank and a standby pump at the City's Columbian Club Pump Station which serves the eastern side of Carrollton. The consulting firm of Birkhoff, Hendricks & Conway, LLP performed all of the engineering work for the project.

As part of the improvements required to meet future demands, the first improvement scheduled for the Columbian Club site was a new six million gallon ground storage tank. Design was initiated in February 2003 and construction was completed in October 2004. Both design and construction were completed without any problems.


2001 WATER DISTRIBUTION
MASTER PLAN

Submitted To

CITY OF CARROLLTON, TEXAS

Submitted By

BIRKHOFF, HENDRICKS & CONWAY, L.L.P.
CONSULTING ENGINEERS
DALLAS, TEXAS

November, 2001

With the new tank underway, the next task would be to determine exactly what was needed to construct a facility that would serve the City for the next 30 years. Since any improvements beyond what was identified in the Master Plan were not really planned for in budgeting, most of the improvement funding would come from pay as you go sources and would be performed over the next several years. With that, Public Works' staff immediately began identifying problems with the pump station which were more maintenance related as opposed to capacity. The existing steel water tanks were already slated for removal as they were deteriorating rapidly from the rust that had developed and were unsafe to walk on. Having been constructed in the 1960's, they had served their useful life and would no longer be needed with the construction of the new six million gallon concrete tank. Coupled with the 5 MG tank that was constructed in 1975, the two tanks could adequately meet the demands of its service area.

As part of identifying needs for the pump station, the original engineering design contract was amended in 2004 to investigate the electrical requirements necessary to add emergency generation to Columbian Club as well as the City's two other pump stations. The study investigated the feasibility of adding emergency generation and switchgear at each station, analyzed required modifications to existing electrical equipment to accommodate the secondary source of power, analyzed space to house the required emergency generator switchgear and then provided a cost for each alternative. Although pressures would be low at the outer extremities, the results showed that the entire City could be served by Columbian Club in emergency situations if all of the zone valves in the City were opened. Although generators were not planned to initially be included in the work, after experiencing a loss in power from a storm in April 2008 and the inability to pump water for a few hours, the City was alerted to the need for emergency generators. With that, funding was set aside and a decision was made to add standby generators to the final phase of the project, thereby ensuring reliability during power outages. With Dallas Water Utilities having dual power sources to get water to the Columbian Club facility, and with the addition of standby generators, the City would be able to supply water to the entire City in an extreme emergency situation. Although the Columbian Club Pump Station would have to be considered the City's second most important pump station after the Don Cline Pump Station which pumps the most water, it could be considered the City's most important pump station.

The Columbian Club facility was served by two separate pump station buildings referred to as High Zone 1 and High Zone 2 which were constructed in 1972 and 1975 respectively. Adding a new pump to the High Zone 1 building, as identified in the Master Plan, was already planned, and standby

generators would also be included. With the basics out of the way, maintenance issues would now be addressed. The motor controls for the pump stations had become major maintenance problems over the years as they had become somewhat antiquated. Any parts needed for repairs had to be custom made and the structures themselves were in need of upgrading so new motor controls were added to the project. Since the motor controls were located in the two pump station buildings, much larger spaces were being heated and cooled than was necessary, and since the two pump buildings were located just 14-feet apart, it was decided to create a new room out of this space by constructing walls on the front and back and constructing a new roof over the entire structure. This new room would become the motor control room which would require much less heating and cooling and the new roof would give the facility an updated look.

With the decisions made about the scope of work that would be performed, design was divided into three additional phases which included (1) plant piping, (2) building improvements and (3) pump, electrical and generators.

Pouring the Tank Base

Construction

The first phase of construction was the new **Six Million Gallon Ground Storage Tank**. Preload, Inc. was the contractor and design and construction proceeded without any problems. The tank was constructed between February and October of 2004 for $1,945,065 and had no change orders.

Pouring the Tank Wall Panels

Erecting Tank Formwork

Installing the Wall Panels

The second construction contract was for the construction of onsite **Water Supply Lines** to take water to and from the new tank. This work was originally going to be part of the Pump Station building renovation but as various options for the remainder of the pump station were being evaluated, it was decided to construct these lines so the tank could be operational for the summer of 2005. The lines were constructed between April and June of 2005 by North Texas Contracting for $230,790 which includes $14,890 of change orders for different fittings because RCCP pipe was encountered when ductile iron was expected.

Pouring the Roof

Connecting the Tank to Pump Station Piping

The Finished Tank

The third project was the **Building Improvements & Piping Connections**. This work included the removal of the old elevated and ground storage tanks, pump station building modifications which included rehabilitation of the two existing pump buildings, walls to connect the two buildings and the construction of a new roof. The old steel ground storage tanks

Pump Station Site with the Tanks that were to be Removed

Demolition of One of the Ground Storage Tanks

were in advanced stages of deterioration while the elevated tank was nearing that stage. With system improvements that had been made over the previous several years, the elevated tank was not needed to maintain system pressures and was more of a maintenance burden than anything else. As a bonus, the new roof canceled a planned reroofing project, saving approximately $30,000 in maintenance dollars. When it came to long term operating costs, the new room, which

The Two Pump Station Buildings Shortly After Construction Began

Outside Renovation and Roof Construction

would house the future motor control center, would decrease heating and cooling needs at the pump station because a smaller area would now require temperature controls.

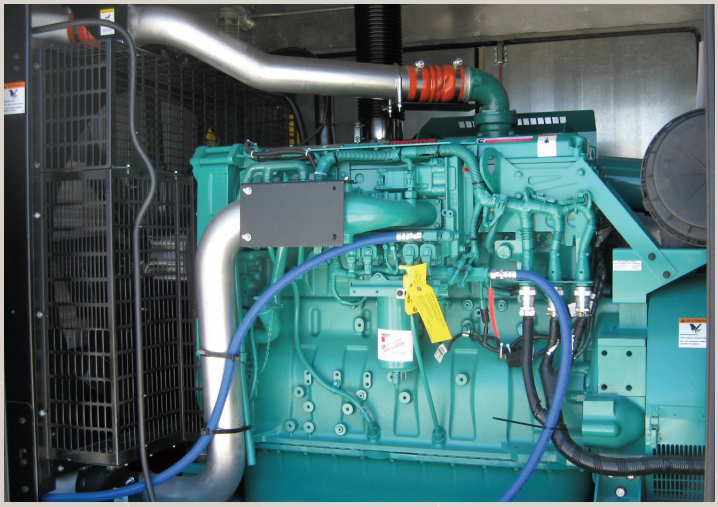
The old pump station buildings had a very plain appearance and were in a need of a facelift. The old tan brick buildings had flat concrete roofs with no redeeming architectural qualities. As a result it was decided to add a simulated stone fascia on the new connector walls with the same stone spaced in column type layouts around the two buildings. Coupled with the new roof, the finished structure had a fresh new appearance.

The old tanks were demolished in November 2007 while the building rehabilitation started in March 2008 and ended in February 2009. The project was constructed by Mela Contracting and the total cost of the project was $1,661,207, which included $132,732 of change orders. Change orders were City initiated and basically dealt with the inaccuracies of as-built drawings and old materials. As construction progressed several old valves were found to not be sealing completely, fittings that were shown on as-built plans did not exist, rotted wood was replaced on the roof soffits, and some sump pumps and duct banks were removed and replaced. These replacements eliminated problems that were sure to surface in the future.

New Problems Were Repaired When They Were Encountered

The Finished Building

The fourth and final phase of the project, **Pump, Motor and Electrical Upgrades**, included standby generators with SCADA interface and automatic transfer switches, power correction equipment for each bank of pumps, a new pump, various pump piping and valves, a new motor control center, and the removal of two old brick buildings, in addition to miscellaneous improvements. These miscellaneous improvements included painting all interior surfaces, repairing damaged floor grating, replacing old valves where needed and replacing lighting fixtures.



Generator Engine

Standby Generators will Enable the City to Provide Water When the Main Power Sources are Down

While equipment was being fabricated, other work was underway which included some additional site piping, removal of two old control buildings, construction of a concrete driveway and the generator pad and painting of the building interiors. As equipment began to arrive, it was installed and electricians began their work to make the equipment operational. This was no small task in itself as it took several months to get all the problems solved and the equipment coordinated with the City's SCADA system.

This phase of the rehabilitation really focused on the operation of the pump station as opposed to the appearance and structural condition as did the previous phase. The motor controls had really become outdated since being installed in the early 1980's, and as previously stated, parts availability and replacement was no easy task. In addition to the controls, many of the 30+ year old valves and piping were replaced around the existing pumps to improve the hydraulics and increase efficiency. After submittals were approved, the equipment was fabricated, which took several months before work in the pump station could actually begin.

Motor Control Room Under Construction

This phase of the project was constructed by Crescent Constructors and started in August 2009 and ended in September 2010. The project was supposed to end in March but equipment selection and fabrication delays added several months to the project. The total cost of the project was $2,461,833 which included $164,833 of change orders. Change orders were City initiated and included the replacement of the site perimeter fence,

New Piping and Valves in High Zone 2 Building

Floor Grating Replacement in High Zone 1 Building

replacement of more defective valves and a new meter on the well pump located within the site property.

Since the pump station site is located away from developed areas, special community relations were not required. The project was listed on the City's website but no questions were raised by residents.

Environmental stewardship and concerns were addressed but were not major issues as the work was contained within the existing site. Erosion control consisted of a construction entrance, silt fences, inlet protection devices, good housekeeping and other construction best management practices.

New Motor Control Cabinets

IMPACT ON COMMUNITY SUSTAINABILITY

In summary, this project contributes to community sustainability by:

- Improving the City's ability to effectively deliver water to the City's system by replacing old facilities (buildings and water tanks) that require more than just regular maintenance.
- Updating the electrical controls eliminates the need to have replacement parts specially fabricated.
- Relocating all of the motors from the two pump buildings into one smaller room reduces air conditioning and heating costs.
- The modifications ensure that the facilities will last for many years while keeping energy costs down and providing an area for future emergency equipment.
- Providing critical continuity of water distribution operations through the installation of emergency power generators. Should the City experience a massive city-wide power outage, this one pump station can effectively operate the 515 mile three service area water system by itself.

New Piping and Valves in High Zone 1 Building

Post Construction

The pump station and all its components have been in operation since October 2010 and the City's water system is moving into the final stages of the plan presented in the 2001 Master Plan. The City's Public Works' Department is enjoying the rehabilitated pump station and new water tank as it takes it through the first half of the 21st century. Knowing that the new motor controls are state of the art with a generator system that will provide water in power outages, they feel confident in the reliability of the station.

The Completed Facilities