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PIPEGROUP
PRESSURE

63-MILE PIPELINE RESTORES WATER SUPPLY TO SAN ANGELO, TEXAS

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PROJECT OVERVIEW

Due to severe drought the City of San Angelo was less than two years from exhausting its main water source. The solution was a 63-mile pipeline that would transport well water from the Hickory Creek Aquifer near Melvin, Texas, to the water treatment plant in San Angelo. Pulling it off in time—early, in fact—required concise scheduling, dual installation crews and a dedicated commitment by all parties.

Owner:	City of San Angelo
Consulting Engineers:	Carollo Engineering
General Contractor:	Oscar Renda Contracting, SJ Louis
Thompson Pipe Group Product:	AWWA C303 Bar Wrapped Pipe; 63 miles, 30 in diameter

MATERIAL SELECTION

Bar-wrapped concrete pressure pipe was a natural fit for the project, considering its economical and conservative design, ease of installation, and successful history in jurisdictions in central and west Texas including previous projects in the city of San Angelo. “It’s easy to work with,” says Dennis Bailey, project manager for Oscar Renda Contracting (ORC), which selected bar-wrapped pipe over ductile iron and fiberglass pipe.

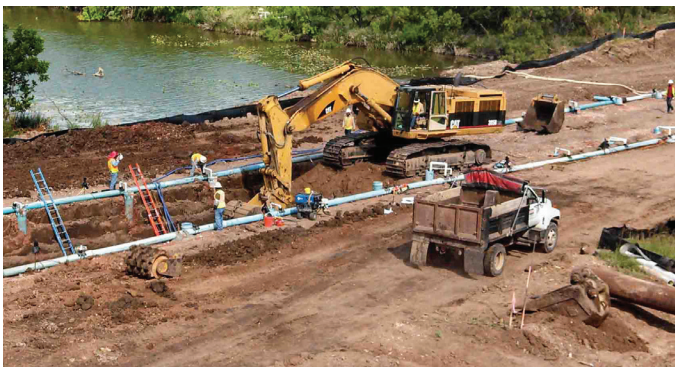
Concrete pressure pipe combines the tensile strength of steel with the compressive strength and corrosion-inhibiting properties of Portland cement concrete and mortar. The stiffest and strongest of the commonly specified semirigid water pipes, C303 bar-wrapped pipe is manufactured using a welded steel cylinder with sized, welded-steel joint rings attached. The steel cylinder is lined with centrifugally applied mortar or concrete. Mild steel reinforcing bar is helically wound around the outside of the cylinder under controlled spacing and tied off to the steel joint rings. Lastly, a coating of dense Portland cement mortar is applied to the pipe exterior for both physical and corrosion protection.

C303 is highly customizable, enabling engineers to tackle tight spaces, long stretches of changing profile and precise sequencing requirements without special bedding and backfill procedures. It also allows for easy modifications in the field, such as adding an outlet, making service taps, and performing simple repairs. Custom, steel plate fittings are also available to complement the pipe lengths.

To meet the time constraints, Thompson Pipe Group Pressure Pipe supplied the bar-wrapped pipe—more than 10,000 30-inch-diameter pipe segment spools in 32 and 35-foot lengths. The pipe included 31 in-line valves, 90 air release valve outlets, and 5 pig launch/pig retrieval stations. Thompson Pipe Group provided standard gasketed joint rings as well as gasketed Snap Ring© joints for those areas where thrust restraints were required. The use of Thompson Pipe Group's Snap Ring© restrained joint ensured a fast, reliable installation without the need to field-weld the joints, further reducing installation time.

INSTALLATION ACCOMMODATIONS

For the most part, the design of the line was fairly straightforward, as it passes through vast swaths of ranch and farmland. However, logistically it was another story, says Bailey. The team had to coordinate easements against some unique obstacles, including avoiding planting, growing, and harvest seasons on farms, which limited construction there to January and February; skipping hunting season on some ranch properties, which restricted the crews during October, November, and December; and having additional restrictions in areas where the blackcapped vireo, an endangered bird species, had nesting grounds.



Oscar Renda's team worked with each of the property owners and included scheduling restrictions in each contract. To meet the short window while also accommodating the various property obstacles, ORC doubled up its crews, with two crews installing in either direction from a midway starting point. Where the pipe crossed the Concho River, the installation crew opted to build an earthen dam, with bypass tubes to allow water through, and dig the trench from above rather than boring a tunnel through the hard rock below. As an added precaution, the team enclosed the pipe with a concrete cage for additional protection from outside impacts. Elsewhere, a variety of fittings and elbows accommodated elevation changes and small creeks to follow the existing line.

The installers were able to use native soil bedding throughout the project, with trenchers breaking up the hard rock and ample screening. Thompson Pipe Group engineers were on site throughout the installation to monitor the bedding material and other aspects of installation, including depth of cover. In anticipation of potential heavy metals in the water, Thompson Pipe Group assisted the owner and engineer with water quality analysis and was able to apply a denser mortar lining to the pipes, making them less susceptible to leaching heavy metals and increasing the durability and expected service life.

In addition, because of the high corrosivity of the native soil, the pipeline included bonded joints that permitted two different types of additional protection. Though concrete pressure pipe has one of the longest performance histories and lowest failure rates of any pipe material, including throughout Texas due to the built-in corrosion protection afforded by the mortar coating, supplemental protection systems can provide additional peace of mind for those areas where aggressive soil is a concern. Near town, where the soil was particularly corrosive, the team opted to include an impressed current cathodic protection system, with a sacrificial anode bed buried 300 feet deep and five rectifiers providing current via solar power. Elsewhere on the line, the team installed testing stations that will allow for periodic monitoring of pipe conditions in the future.

The final stage of the installation comprised hydrostatic testing of the line in segments, which provided for its own unique set of hurdles: Bailey reports that the different pressure planes required testing of the line between 150 psi to 300 psi, the highest he's ever encountered. Still, the entire pipeline length, a total of 63 miles, was successfully tested and determined to be leak free. The quick and successful test and acceptance of the line ensured water could begin flowing as quickly as possible—in just a year and four months—to the people of San Angelo.