

Leak Free in Lago Vista

Texas Hill Country city switches to HDPE pipe



By Steve Cooper

In an effort to conserve as much water as possible and increase the longevity of its water system, the city of Lago Vista, Texas, has switched entirely to high-density polyethylene (HDPE) pipe. Located northwest of Austin, the 10-sq-mile community, with a population of slightly more than 6,000, has replaced portions of its existing water system with HDPE pipe and installed an additional 35 miles of HDPE line extensions since starting the effort in 2009. According to the Plastics Pipe Institute Inc. (PPI), a trade association representing all segments of the plastic pipe industry, it is the most recent city to switch entirely to HDPE pipe.

"Lago Vista is another city in North America to adopt an HDPE-only policy," said Tony Radoszewski, president of PPI. "In the U.S., our research has found there are almost 900 water main breaks daily. Plus, there are numerous miles of old pipe that continually leak millions of gallons of water. Some major cities lose as much as 40% of their water supply each day due to cracked and deteriorated pipe."

According to the Houston Chronicle, in December 2014, enough water seeped from broken pipe in Houston to supply 383,000 residents for one year. According to city records, Houston pipeline gushed

22.4 billion gal of water in 11,343 leaks last fiscal year, equating to about 15.2% of the city's total water supply.

Replacement Process

The old galvanized ductile iron and PVC pipeline found in Lago Vista are being replaced as needed with HDPE pipe by the city's own installation crew. All new water and wastewater line extensions are installed with HDPE pipe. The only components not made from HDPE that the city currently installs are fire hydrants, valves and meters.

"When the city decided more than five years ago to switch from installing the legacy piping systems to exclusively using HDPE piping, I knew that we were on the cutting edge of technology," said Dave Stewart, director of public works for the city of Lago Vista. "While researching HDPE, it became apparent to me that HDPE pipe would be a perfect fit for the city's water and wastewater systems. I trusted the HDPE piping system and got approval from the mayor to move forward with the use of HDPE pipe for all future line replacements and extensions in Lago Vista."

Stewart said the city's population density is so low that, when combined with the industry-acceptable 10% bell and spigot leakage rate for legacy pipe, its water loss rates were disproportionately higher than other cities. "We wanted

a leak-free pipe because we were losing too much water in the water system for the amount of people that we were serving, plus HDPE pipe would also give us a more flexible piping system that would withstand the large amount of ground shifting that occurs in the city from droughts and excessive rainy events, which were breaking our legacy piping system like toothpicks," he said.

Stewart, who has been with the city for almost 30 years, first became aware of HDPE pipe about 10 years ago. "The Lower Colorado River Authority (LCRA) was having a hard time with a high-dollar lakeside subdivision that was going in—it didn't want septic systems that close to the lake, but rather a wastewater collection system instead," he said.

The lots were so close to the lake that there was concern that the PVC pipe was going to leak into the lake, Stewart said, so the developer decided to use HDPE pipe for the force main. Although the HDPE pipe was accepted by LCRA for the force main, the developer did not consider using HDPE pipe for the water lines as well.

Stewart took over the inspection for the subdivision in 2005, saw the HDPE pipe for the first time and thought it would be interesting to use it for water line.

"That's when Todd White of Gajeske Inc. Houston, our HDPE pipe supplier, got involved," Stewart said. "Todd and I researched what equipment the city would need to install and maintain HDPE water and wastewater systems, the availability of various HDPE fittings, and what training the utility department employees would need to make the switch over to installing only HDPE pipe."

It took about 18 months to get the city administration to agree to the switch, Stewart said. "We switched over to HDPE pipe and never looked back ... There's a 250-ft piece of 12-in. HDPE pipe that was installed aboveground in 1996 on the side of a cliff near the lake, and we've never had a leak or any problems with it. The HDPE pipe replaced a legacy pipe that kept splitting on us again and again."

David Walden, superintendent of water and wastewater for the city of Lago Vista, explained some of the additional benefits that the city has seen.

"We no longer have bell-to-spigot

splitting issues, beam break issues, or bell and spigot leaking issues," he said. "Plus, with HDPE, you are able to make sweeping corners."

Walden said that his crew would pre-fuse the HDPE pipe into 200- to 500-ft-long stringers outside the ditch and then roll the pipe into the ditch with the tires of a backhoe after the ditch had been sanded. The crew spent less time in the ditch because of the above-ditch pre-fusing, so the safety risk factor for the line replacement/extensions goes down significantly.

Developing a Plan

The group first met during the planning stages to discuss pipe, adapters, fittings, fusion equipment, and technical assistance and instruction.

"For the fittings and adapters, I brought in Harvey Svetlik of Georg Fischer Central Plastics," White said. "He has a wealth of knowledge and has designed many HDPE pipe components, including the Bell MJ adapter. This was important because we were going to join the new HDPE pipe with a variety of PVC and ductile iron pipe. With the Fischer adapters, HDPE pipe can be fitted with a bell end in order to accept ductile iron pipe or ductile iron pipe standard outside-diameter PVC pipe."

While adapters are important in all systems, the need was critical in this hilly part of Texas, Svetlik said, which has a lot of sloping land. The composition of the soil also was a factor. Buried pipe not fused or fully restrained that runs up and down this hilly terrain can disengage and pull gaskets apart over time.

"HDPE pipe, when properly installed, will not face this issue," Svetlik said. "It will provide a zero-leak-rate system. So, solving the problem Lago Vista was having with leaks was first on Dave Stewart's list. Todd and I explained how the HDPE system is fused and not coupled. Dave brought up whether the HDPE pipe could be tied into the city's existing iron and PVC pipe where necessary, and also how to securely attach fire hydrants and meters, for example. The Bell MJ (mechanical joint) adapter provided the answer he was looking for."

The Bell MJ adapter can accept 2- to 16-in. iron pipe size outside-diameter PVC

pipe by using a transition gasket. This fitting eliminates the need for a ductile iron solid sleeve when making this connection. The adapters are fully pressure rated for any dimension ratio needed and are American Water Works Assn. (AWWA) compliant. For connection to ductile iron pipe, the Bell MJ adapter uses a mega lug mechanical restraint device. "Both these adapters act like an HDPE fused joint and are permanent," Svetlik said.

The HDPE pipe used was PE 4710.

"Development of high-performance polymers such as PE 4710 has enhanced material properties, including higher tensile strength, compressive strength, pressure rating and exceptionally high resistance to slow crack growth," said Camille George Rubeiz, P.E., director of engineering for PPI's Municipal Div. "It is designed for water and wastewater applications and meets AWWA C906 and ASTM F714 standards. In addition to cut and cover, the pipe is ideal for trenchless installation such as horizontal directional drilling, pipe bursting, Swagelining and sliplining. PE 4710 allows water companies to use higher pressures and greater flow capacity, due to the thinner wall pipe."

Most line is installed using cut and cover. "We do bore under roads," Stewart said. "And we have pipe-burst our smaller water services up to 2 in. Recently, we bored a 52-in. hole at a 40-degree angle to put in a 368-ft, 24-in. HDPE raw water line."

For Lago Vista water projects with pressure ratings from 15 to 130 psi, the pipe is being used in diameters from ¾ to 24 in. "We standardized on DR13.5 for most of our lines," Stewart said.

As part of the city's complete shift to HDPE pipe, a city department was created that acts like an internal construction company. "We look after everything HDPE—logistics, planning, construction of new infrastructures and replacing legacy pipe that has deteriorated," Stewart said. Walden added, "We've probably saved the city more than a half-million dollars in the last four years by doing the work ourselves."

Bright Future

Developed as a lake resort in the 1960s, Lago Vista was incorporated in

the early 1980s. Being located on a lake, however, does not mean that water is plentiful. Lake Travis and nearby Lake Buchanan provide drinking water to more than a million people, as well as water to serve industries, businesses, the environment and, when available, agriculture in the lower Colorado River basin.

In early December 2014, the combined storage of Lake Travis and Lake Buchanan stood at 34% capacity. If it falls to 30% capacity, the LCRA board of directors will issue a "Drought Worse Than the Drought of Record" declaration. Following a state-approved plan, LCRA then would require all cities, industries and others to reduce water use by 20% from a baseline year.

Lack of rainfall also caused all public, no-cost boat ramps on Lake Travis to close during the summer of 2014 because the lake level was too low to use them safely. Most had been closed for more than a year due to persistent low lake levels.

Lago Vista expects to save millions of gallons of drinking water during the lifetime of the HDPE pipe, which is projected by PPI at 100 years.

"Our city is on the cutting edge of trying to conserve as much water as possible," said Lee Wallace, AMR/utility crew leader for the city of Lago Vista. "We work to give our customers their supply, but by conserving and improving our water line, we're also giving back to our state. I don't know how many other communities can say that. And during the past two years we've stepped up our efforts and installed 175,000 ft of HDPE pipe." **w&wd**



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