

## A Challenging Gravity Sewer Bore in Fort Worth Not a Problem for Texas HDD Contractor By Sharon M. Bueno

**P**lanetary Utilities Inc. recently completed a difficult gravity sewer project for the City of Fort Worth, Texas, which the drilling contractor believes to be the longest such directional bore on grade for gravity sewers that's been done to date.

Total length of the gravity sewer bore — done in one shot — was 837 ft, said Brian Sauer, CEO of Planetary Utilities and project manager for this particular job. He said he's asked various manufacturers and contractors in the industry and was told that this bore was the longest gravity sewer bore that had been completed on grade.

"Because this was for a gravity feed sanitary sewer, there is a target flow line that must be hit with absolutely zero deviation," Sauer said. "As much as a couple of inches could cause a belly in the pipe and the City may reject the system."

Among the challenges the Planetary Utilities crew faced — besides being on grade at 1.25 percent — were the ground conditions. Drilling in depths exceeding 30 ft through mostly sandstone.

"The deeper we got, the harder the sandstone was," Sauer said. "(The sandstone) made it difficult to maintain pitch but we made it happen."

Sauer noted that the boring of the pilot hole was also crucial to keeping the project on target, citing the number of reamer changes. "Every time we changed a reamer, there was a chance of cutting too much out of the bottom (of the borehole)," he said.

A majority of the sewer project was handled by Omega Contracting Inc. using open-cut methods of installation; however, there was a small section of the project that required methods other than open-cut, which Omega Contracting could not provide. Dallas-based Planetary Utilities was hired by Omega

Contracting to handle this portion of the project, in which a rural-residential area was being connected to the City of Fort Worth's sewer line.

The HDD portion of the project called for the installation of an 8-in. ductile iron pipe that was housed in 16-in. steel casing. Sauer said his first reaction was to ask for a product change from ductile iron pipe to HDPE. "Having been in the drilling business for over 10 years, I knew that ductile iron pipe is cumbersome and brittle on short bores of 200 feet or less. I couldn't fathom placing it on an 800-foot plus bore," Sauer said. "I requested use of HDPE product.

"Because this bore was for a sanitary sewer system operating under a gravity feed, the challenge we faced was maintaining the target flow line at a 1.25 percent negative fall," he said. "The HDPE product would allow us to have less displacement, a strong tensile strength and flexibility aboveground."

But Sauer's request was denied by the City of Fort Worth and the project proceeded with the ductile iron pipe. Planetary Utilities utilized a Vermeer 50x100 drill for the project, as well as a



Planetary Utilities was hired to complete the HDD portion of a sanitary sewer project for the City of Fort Worth in which a rural-residential area was being connected to the City's sewer line. Eight-inch ductile iron pipe was installed inside 16-in. steel casing.

Digital Control Inc. Eclipse locating system. Reamers used were all shop-built by Planetary Utilities. Craig Caswell with DCI supplied technical support for the bore profiling and Larry Glover and his team at Ditch Witch Equipment in Arlington, Texas, assisted and consulted with fluid management.

“Our pilot bore was shot with a DCI Eclipse system. After shooting elevation every 10 feet, we would double-check ourselves against the target flow line,” Sauer said, noting that he leaned heavily on the locating system to make sure the bore remained on grade at all times.

With the pilot bore completed, the Planetary crew moved ahead with the reaming and pullback. To ensure that the mathematical offsets were accurate, the crew custom-built telescoping sleeves to help align the next reamer with the completed reamer’s pass; this was how the crew maintained the proper calculation for soil displacements so the rods were not laying in the bottom of the pre-reamed hole.

The Planetary crew pre-reamed all the way to a 24-in. hole, starting at 8-in. and enlarging the hole to 12 in., then 18 in. and finally the 24-in. To ensure that the casing did not hang up during installation, the Planetary Utilities crew attached a 150,000-lb Kenworth wrecker to the casing at the tail ditch to assist the 100,000-lb rig at the pullback point.

“The wrecker could spool off approximately 100 feet of one-inch steel cable,” Sauer explained. “With the wrecker anchored to the front of the tail ditch, we reached out as far as possible and welded a D-ring right to the casing, attached the cable and assisted in the pullback. When we ran out of cable, we simply cut the D-ring loose and did it again.”

After the casing was pulled back, the crew prepared to install the 8-in. ductile iron pipe. Concerned about possibly pushing the pipe for such a long distance, which may result in cracking a bell joint, Sauer employed the JD Method of Placement. Here, the drill rods are placed inside the unoccupied casing. Once the rods are pushed out at the exit pit, the pipes are loaded one by one into the ditch and onto pipe rollers — and then the rods are inserted through the pipe. A butt plate that threads right onto the rod grabs the ductile pipe from the rear and, by radio communication, the drill operator gently pulls the pipe into the casing with the rod.

“Communication is critical here because the joint of the ductile that you are populating into the casing must be stopped right at six inches outside of the open mouth,” Sauer said.

A resistance plate was installed to hold the joint that’s inside the casing to allow the new joint to bell up properly and is then pulled in like the joint before it; this process is continued until the ductile is at the other end. The rods that are strung through the casing act as a leader rail, preventing the ductile from buckling or shifting to failure or fracture inside the casing. The rig superceded 35,000 lbs of pullback during this process, Sauer said.



This project is believed to be the longest directional bore on grade for gravity sewers that’s been done. Total length, which was done in one shot, was 837 ft.

“I can honestly say that conventional placement was not an option,” Sauer said. “The JD Method (of Placement) was successful.”

The HDD portion that Planetary Utilities worked on took three weeks to complete. The Planetary crew didn’t breathe a sigh of relief for their work until the City of Fort Worth inspectors completed their evaluation of the line.

“Everything went really smooth,” he said. “I worked in the field with the crew and we prepared ourselves before we went out there (to prevent problems). The pipe went in, the inspection was done and everyone was really pleased.”

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Among the challenges that the Planetary Utilities crew faced were the ground conditions. The crew drilled in mostly hard sandstone, which made it difficult to maintain pitch.