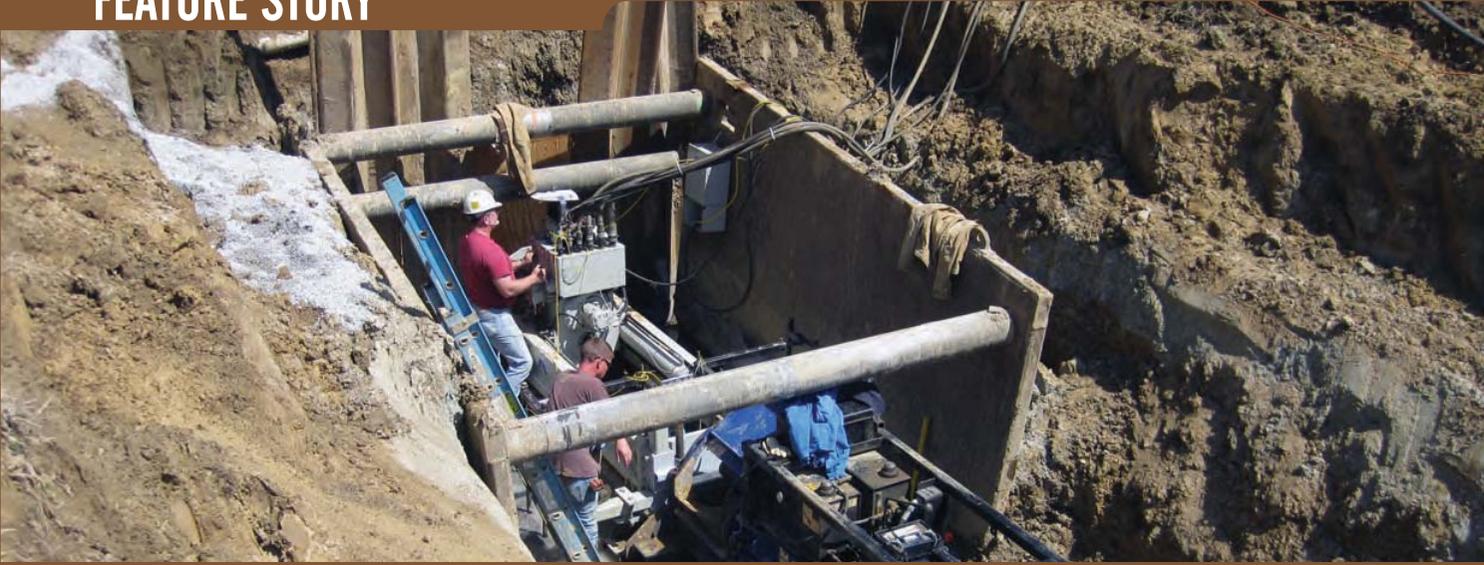


FEATURE STORY



PLOTTING THE COURSE

API CONTRACTORS USES PILOT TUBE/GUIDED BORING TO RELOCATE TRANSMISSION LINES IN PADUCAH

BY: LAURA ANDERSON

This past spring, API Contractors completed a 210-ft drive using a GBM 240 jacking frame and guidance system to provide accuracy for their auger bore machine in the West McCracken County Industrial Park in Paducah, Ky. Geological deviations and the presence of deeply buried utilities required creative solutions to plot the course for an accurate drive.

The project owner, Jackson Purchase Energy Corporation of Paducah needed to relocate the overhead transmission lines in its industrial park into underground conduit pipes to connect to an electric substation. API Contractors of Calvert City, Ky., conducted the pilot tube bore and installation of 18-in. OD steel casing pipe in 20-ft segments. The general contractor, Murtco Inc., also of Paducah, installed 6-in. HDPE with two 1.5-in. conduits containing the high-voltage lines inside the 18-in. carrier.

Although guiding an auger boring machine to ensure line and grade tolerances is typically used in gravity flow installations, this project required precision and accuracy to bypass the buried utilities and achieve the necessary amount of cover under a creek to meet the tie-in.

The design-build nature of the project allowed the contractors to choose which installation method made the most sense for the series of complexities involved. Design decisions had to be approved by the Kentucky Department of Transportation.



ABOVE: API CREW MEMBERS ARE SURVEYING THE SHAFT FLOOR PRIOR TO SETTING UP THE EQUIPMENT TO ENSURE THAT THE ELEVATION IS CORRECT.

BELOW: THE 18-IN. CASING SECTIONS EMERGING FROM THE 7-FT EXIT SHAFT.



CREW MEMBER RANDY STORY OF API CONTRACTORS INSTALLING THE PILOT TUBES.

Initially, the drive was expected to be 150-ft in length. The buried utilities in this area consisted of a water main, gas main, gravity sewer line and a sewer force main. The pipe line also had to cross under a 10-ft creek, while allowing at least 42-in. of cover above the pipe. The utility locating contractor had difficulties identifying the locations of the utilities. By means of spot excavating, API was able to determine the exact location and grade of each utility. The water and gas mains were found to be 4-ft deeper than initially expected. With this information, API revisited its original project design and decided to relocate the launch shaft 65-ft back from its original position. Doing this allowed API to clear the utilities and achieve the 1.7 degree grade at the necessary depth under the creek and to ultimately unite with the electrical tie-in.

GUIDING THE BORE

Work began on April 22, 2013. Crew members set up their Akkerman GBM 240A jacking frame and guidance system on the American Augers 24-150 auger bore rig rails, powered with a 100-hp P100Q Akkerman diesel power pack. Submersible pumps were installed in the shaft and ran continuously for the remainder of the project to mitigate inflow of water in the saturated and permeable soils. The launch shaft was trenched in at 14-ft deep.

When using the GBM 240A jacking frame with an auger boring rig, the pilot tubes establish the desired path on line and grade. The jacking frame is mounted on the auger bore machine rails with a universal adapter. The theodolite and camera are mounted between the jacking frame and auger bore machine to sight-down the center of the pilot tubes. An LED target is placed in the steering head. The theodolite's cross hairs are

aligned to the drive's line and grade and the camera relays this data to the computer-controlled digital monitor, mounted to the GBM jacking frame. The operator assesses the target's position throughout the course of the drive on this monitor. If a line and grade adjustment is necessary, the operator turns the pilot tube string in the appropriate direction. This action rotates the angled steering head and displaces the ground until it achieves the appropriate grade. Once the pilot tubes span the full length of the drive, a choice of ground specific tooling is available to weld onto the first casing and auger section. As the pipe string advances, pilot tube sections are removed from the reception shaft.

A bore log was not available near the West McCracken County Industrial Park, so the pilot tubes provided the opportunity to act as a probing tool to reveal the ground conditions. API crew members carefully monitored the thrust and torque pressures during the pilot tube pass. They found that the first half of the drive consisted of loose gravel and sandy clay that mixed with running water when approaching the creek crossing. The last half of the bore transitioned to sandy then moist clay. Pilot tube sections were removed from a 7-ft exit pit near the power pole.

In lieu of a weld-on reaming head, an Akkerman pilot guide rod was attached to the last length of pilot tube and first section of casing to reduce thrust at the face of the bore. The casing and auger pass was heavily lubricated with a bentonite solution. Extra lubrication kept the pipe string moving despite the abrasive gravel and moisture during the first portion of the drive, and reduced friction and prevented stickiness on the outside of the casings during the second half. API crews found that the extra lubrication was an appropriate decision, as they did not



encounter thrust pressures above 10 tons during both passes.

Using the GBM guidance system to monitor and maintain line and grade allowed the drive to accurately advance a mere 8 in. under the deepest utility, proceed correctly below the creek bed and emerge within the 6-ft power pole easement. API was able to complete the utility location work, pilot tube and casing, and auger passes in one week's time.

API Contracting is a water, sewer and auger boring contractor serving a five-state region. The privately held, second-generation, family-owned business has been in operation since 1983. APIU's primary methods of construction include auger boring and horizontal directional drilling. With its GBM system purchase in November 2012, API has found increased demand in subcontracting to other auger boring contractors to provide line and grade control. The Jackson Purchase Energy Corporation project represented their ninth project since their GBM purchase, and 13th to date.

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