

Cost-Saving HDD, PVC Upgrade Town's Entire Water System



The residents of the small town of Wheeler in northwest Indiana enjoy a plentiful, dependable supply of clean, good-tasting drinking water. But that wasn't always so.

Not long ago, water to the 160-plus homes and dozen businesses depended on water from individual water wells. There was concern that contamination from septic tank systems that were used before the community's sewer system was installed, was leaching from a closed landfill and affecting the safety of groundwater that was the source of water drawn by the wells, said John Hack, president of the board of the White Oak Conservancy District, the agency responsible for water and sewer services in the area that includes Wheeler.

Ultimately, a completely new water distribution system was installed, insuring Wheeler residents a plentiful supply of safe drinking water and an ample supply of water for fire protection. The system includes a booster pumping station to maintain water pressure.

Construction of the system, including mains and services, was done entirely with trenchless methods and 95 percent of the mains put in place by horizontal directional drilling (HDD). It is believed to be the first time in Indiana that a complete water system was installed via trenchless construction.

"Because pipe for the new system had to be installed in developed areas, it was important to minimize surface damage," said Jeff DeWitt, P.E., senior project engineer for the Bonar Group, consulting engineers on the project. "Directional drilling was a good choice for the project because it permits trenchless installation of new pipe beneath streets and other surface improvements with minimal surface disturbance."

The innovative use of trenchless construction on the project earned an award from the American Council of Engineering Companies of Indiana.

Accepting HDD

The district was aware of the technology, but had never used it, said Hack. "We were very open to using trenchless construction because we wanted to avoid disrupting the town as much as possible and it was clear

that directional drilling would reduce the cost of restoration that is necessary with excavation."

Mains included 29,400 linear feet of PVC pipe: 10,300 feet of 6-inch diameter pipe; 4,300 feet of 8-inch; and 14,800 feet of 12-inch. All pipe was CertainTeed C900/RJ PVC Certa-Lok pipe. The pipe is ideal for installation by directional boring because pipe sections are connected with couplings which lock tightly and will not pull apart when the pipe is pulled into place by the drilling machine. Precision-machined grooves of pipe and couplers are aligned, and a nylon spline is inserted to lock pipe and coupling together.

Services were 3/4- and 1-inch type K copper, the size depending on the length of the service. They, too, were installed by HDD.

The general contractor was Atlas Excavating which also did all directional drilling.

Mains were installed primarily in residential areas. One line went along a state highway with mains branching off in easements adjacent to streets. Surface conditions of easements included asphalt and concrete streets and landscaped areas.

Wheeler Water Project Is Award Winner

The excellence of the Bonar Group's work on the trenchless construction project for the White Oak Conservancy District water system for the town of Wheeler, IN, was recognized by the American Council of Engineering Companies of Indiana with a 2004 Merit Award.

Bonar services on the project included route and site surveys, preparation of technical specifications and construction drawings, preparation of bidding and contract documents and assistance with the bid process, attendance at public meetings, and providing construction administration and construction inspection.

The award recognized Bonar's originality in the use of horizontal directional drilling to install restrained joint PVC pipe and demonstrated that horizontal directional drilling is a viable option for construction of large water systems.

"We made approximately 300 bores for the mains and individual bores for each service connection," said Atlas Excavating President Tina Dillon. "Subsurface conditions included sandy clay and clay. Bore lengths for mains ranged from 45 to 900 feet."

Two of the company's four HDD units were used: a 24,000-pound pullback Vermeer D24x40 and 30,000-pound pullback Case 6030. Pipe for 6- and 8-inch mains were pulled in directly behind a backreamer. For 12-inch pipe, one backreaming pass was made before the pull-in.

Special connections

The PVC pipe was pulled in a joint at a time. "The connections can be made so quickly it isn't necessary to assemble a string to install this type of pipe," said Atlas Project Manager Tony Kinsler, "although it's possible if there is sufficient space and the project owner and contractor choose to do so."

One interesting aspect of the job, Kinsler added, is that pilot holes for services went under the foundation of homes and exited into the houses.

Bonar's DeWitt pointed out that Wheeler is separated by two sets of parallel railroad tracks owned by different railroads.

"Six railroad crossings were required," he explained. "Because mains under the tracks had to be placed in steel casings, ductile iron pipes were installed by the jack-and-bore method, so these segments also employed trenchless construction."

Planning and securing funding for the water system required years, says Hack. From the time planning for the project began until the last service connection was made was several years, but the long time frame was not due to construction, but because of the multiple entities involved with funding, permitting and water supply agreements.

Hack said the district and residents of Wheeler are well pleased with the project. Originally budgeted for \$2 million, the contract came in at \$1.6 million.

"The cost was lower in part because of directional drilling," said DeWitt. "The project documents that there can be significant cost savings when restoration items such as repairs to roadways, sidewalks and landscaping are not needed."

Unexpected

DeWitt added that the goal of minimizing disruption of routine activities of Wheeler residents also was realized.

"At one point during construction," he said, "the district began to receive com-



Restrained joints lock lengths of pipe firmly together and can be made as fast as lengths of drill pipe are removed from the drill string, making it unnecessary to assemble a long string of pipe for installation.

plaints from citizens asking why construction had not been started. When the district council replied that, in fact, about 50 percent of the pipe was already in the ground, the attitude changed. They simply didn't realize water pipe could be installed without digging trenches."

With offices in five Indiana cities – Fort Wayne, Valparaiso, Indianapolis, Scottsburg and Haubstadt and one in Defiance, OH – the Bonar Group specializes in architectural, transportation, and environmental engineering; site development; and construction project management for a diverse group of clients. The company has been involved in HDD projects for about 10 years.

"Most directional drilling we have been involved with was done with HDPE pipe for small diameter pressure sewers in lake communities in Northern Indiana," said DeWitt. "We also have used some pipebursting on projects and several CIPP projects for rehab. Our CIPP projects are usually in conjunction with major rehab to large parts of existing systems."

Atlas Excavating, West Lafayette, IN, is a water and sewer contractor specializing in deep, wet installations and employs both open-cut construction and horizontal directional drilling on its projects. Most HDD installations are for force main sewer systems and potable water projects, said Dillon. In addition to the drill units used on the Wheeler project, the company operates a 60,000-pound pullback American Augers DD-6 and 49,500-pound pullback Vermeer D50x100.

The White Oak Conservancy District purchases water from the Indiana Amer-

ican Water Company which is contracted to operate the Wheeler system. Water comes from Lake Michigan, is treated at Indiana America Water facilities, and distributed to Wheeler patrons.

Now that the system is in service, some residents have capped their old wells; others continue to use well water for irrigation.

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