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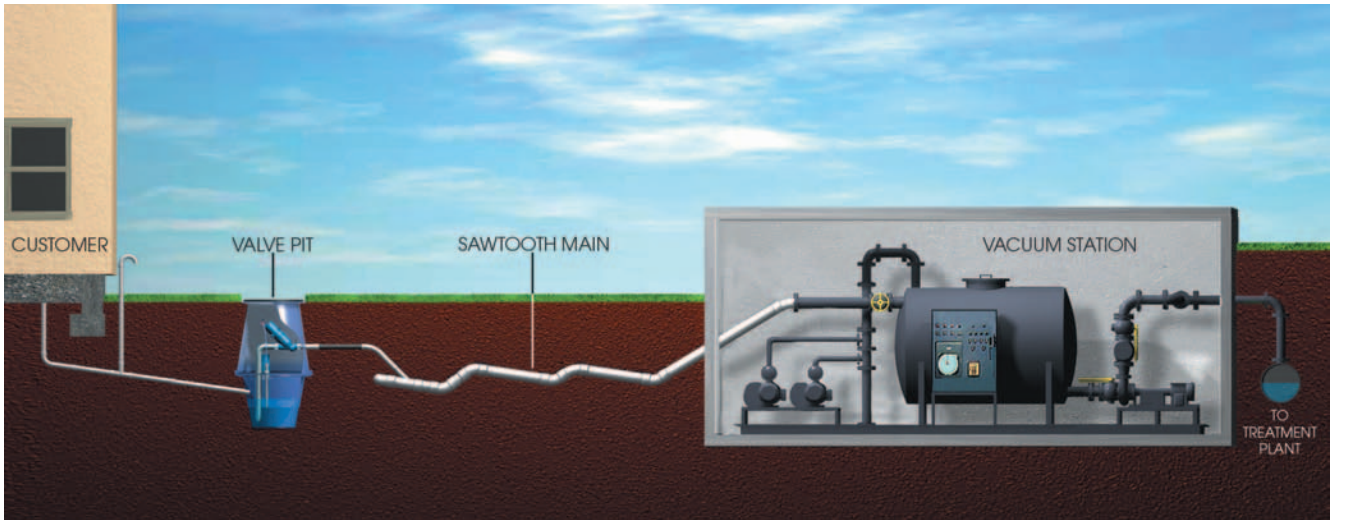

Vacuum Technology Solves Sewer Problem in Show-Me State

Problem: State regulations forbid septic tanks, but the flat Midwestern landscape made a gravity-based sewer system problematic.

Solution: A vacuum sewer system.

On the cusp of the Mark Twain National Forest and the Mississippi River delta, east Butler County, Mo., is flat and waterlogged. The 16-km^2-area (6-mi^2-area) has an elevation difference of only 2 m (6 ft), a high water table, and a lot of seasonal groundwater. It is a challenging place to install a sewer system — just ask Stan Schultz, president of Schultz Engineering Services (Poplar Bluff, Mo.).

In 1997, the newly formed East Butler County Sewer District (Poplar Bluff, Mo.) hired Schultz to design a central sewer system for 465 homes in the area because new state regulations forbade septic tanks. Without sewers, the homes could not be financed by banks and so would be nearly impossible to buy or sell.

"We had two options initially: either pump effluent to the Poplar Bluff treatment plant or build a treatment facility in the eastern part of the county," Schlutz said. "There were some environmental issues that prevented us from pumping to the Poplar Bluff plant, so we had to design and build a system in east Butler County, and the geography there is pretty challenging for building a gravity-flow sewer system. … A gravity system would have required some very deep trenches and a lot of dewatering [to keep the trenches dry during construction]."

The District wanted three collection and treatment alternatives, so although Schultz had virtually no experience with vacuum sewers, he began researching them for his engineering report. "I really didn't want to use a vacuum system initially, but I had to come up with three alternatives," he noted. However, "the more we looked at a vacuum system, the more we liked it."

Intrigued by some product literature left months earlier by AIRVAC Inc. (Rochester, Ind.) representatives, Schultz contacted the company for more information and training about their product and its application in Butler County. In a vacuum sewer system, wastewater flows by gravity from each house to a valve pit that is equipped with a vacuum interface valve that prevents system vacuum from entering the house plumbing. When 38 L (10 gal) of wastewater accumulate in the pit, the interface valve opens and the contents of the pit are evacuated to the vacuum lines. Wastewater then travels through the vacuum lines to the vacuum station where it is collected and pumped to the treatment plant. Schultz and the District quickly realized that a vacuum-based system would be the most affordable and effective option.

"It was much easier to install than we expected," said David Stinson, a Schultz engineer who oversaw most of the installation. The AIRVAC system adapts more easily to unforeseen circumstances than a gravity system, he noted, explaining that "with a vacuum system, if you have to work around a buried utility, a tree, or whatever, you just move over a bit, or go under it or around it. It's no big deal."

Most of the 34,400 m (113,000 ft) of sewer lines are buried only 1 to 1.5 m (3 to 5 ft) deep, so little construction dewatering was necessary, Stinson said. Some of the lines are up to 4 km (2.5 mi) from a vacuum station, but overall fewer pumps were needed than a similar gravity system would have required.

"We estimated that the vacuum system saved about $400,000 in construction costs," Schultz said. "One thing we learned from this project: in the future we'll try to use a vacuum system whenever possible. We like it."

For more information contact
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