

Sustainable LandDevelopment

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TODAY

ANNUAL WASTEWATER ISSUE

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The VACUUM Alternative

By Steve Gibbs

A cost-effective sewer solution proves beneficial for Florida project.

Sewer infrastructure is often the “X” factor in the profit equation of most residential real estate developments. It is a not-so-hidden cost that can turn a profitable venture into a losing proposition.

Development companies with projects in low-lying, coastal-like areas often face enormous sewer infrastructure costs. High ground water, sandy soil and flat topography are typical for many of these developments. The combination of these conditions usually means an expensive and complicated sewer installation.

The Orlando Division of Ryland Homes faced a difficult sewer situation recently with a development called Waterside Pointe in Groveland, Florida. The tract, approximately 370 acres, is virtually flat with only 1.5 feet of elevation variation across the site. It is surrounded on three sides by a navigable canal waterway system and has a 220-acre lake on the interior. Needless to say, the ground is sandy and the water table is very high.

Ryland Homes’ Land Manager Steve Rosser, P.E., observed the situation and was concerned with what he saw.

“We were looking at long sewer runs, from one end of the site to the other,” said Rosser. “We realized the sewer lines would have to be very deep and we would require several lift stations, perhaps as many as five for the 525 lots on the site. Five lift stations would take up a lot of valuable space and not be aesthetically pleasing for this destination community.”

Power Problems

The cost increases associated with building several lift stations are obvious, but the soil and water conditions of the property also created other significant budget concerns. Deep trenching is expensive and time consuming. It also is potentially dangerous as soil cave-ins can occur.

As a civil engineer, Rosser was familiar with other sewer technologies that would alleviate most of these issues. Two alternatives immediately came to mind: low-pressure sewers and vacuum sewers.

Low-pressure sewer systems rely on individual electric grinder pumps at each house. The grinder pumps mulch the sewage created at each house, then pump it through a low-pressure line that intersects with the larger collection line. Grinder pumps work fine as long as there is electrical power. Rosser, a Floridian, immediately saw the electrical power requirement as a limitation of such a system.

“Power outages are always a possibility in Florida,” he explained. “During the hurricanes of 2005 this entire area was without power for days. You can’t expect every lot owner to have a backup generator. A sewer system that relies on electricity at each home creates the potential for some difficult problems.”

Vacuum sewers, however, do not require electrical power at the valve pit, nor does every house require its own valve pit. Two adjacent houses share a valve pit that operates pneumatically. Only the vacuum station requires electricity, and it can be equipped with a backup generator. Vacuum sewer lines also can be buried much shallower than gravity lines, making installation much simpler and less expensive.

Rosser’s interest in vacuum technology led him to contact AIRVAC, Inc., a world leader in vacuum sewer systems.



He called the AIRVAC office in Tampa, Florida, to arrange a demonstration.

The System in Action

David Elias and Frank Bland of AIRVAC invited Rosser, along with some of the Ryland team and a few public works officials from Groveland, to tour a nearby AIRVAC system in Sarasota. A demonstration is worth a thousand words, and seeing the technology up close would help Rosser make the important decision about how to design the property's new sewers.

"The tour was extremely helpful in our decision making process," said Rosser. "The AIRVAC people showed us everything, from the testing facility to the vacuum stations. We were impressed with all of it, especially the vacuum stations. They covered a small footprint, fit in architecturally with the surrounding neighborhood, had no odor, produced very little noise, and seemed easy to maintain. Each station serves a lot of homes and has a backup generator, so in the event of a power loss, you simply crank up the generator and sewer service continues uninterrupted for all the homes on that system."

Maintenance was also an issue to address with the officials of Groveland, who ultimately are responsible for operating and maintaining the system. Having a low-maintenance sewer would make it easier for Ryland to turn over the new system to Groveland's Department of Public Works. What they saw in Sarasota was a smooth-running sewer system that required minimal maintenance.

"It was essential that Groveland's public works officials see the benefits of vacuum technology," Rosser explained. "Being a developer, we aren't in the sewer maintenance business. Getting the city to accept and maintain this system was a key factor."

Easy Does It

The valve pits, collection lines and vacuum stations in Sarasota provided an excellent example of a low-maintenance, high-performance system.

Advantages of Vacuum Systems in Hurricane Prone Areas	
ADVANTAGE	WHY?
Treatment Plant Not Affected	Vacuum systems are sealed, so massive amounts of I & I cannot enter the system and overwhelm the treatment plant.
Uninterrupted Service	All vacuum stations have either a fixed or portable standby generator, which ensures uninterrupted service to customers.
Less Hurricane Preparation is Required	Vacuum systems eliminate the threat of massive I & I and sewage spills. In coastal areas one vacuum station typically replaces 7-8 lift stations – less storm prep work for your staff.
Safer Working Conditions for the Maintenance Staff	Most vacuum stations have the fixed generators that automatically start during a power outage. A vital safety feature – no need to expose your maintenance staff to the severe weather.
As a Last Resort, a Vacuum System Can Be Shut-off	If water levels rise to the point where the air-intakes are in danger of flooding, the entire vacuum system can easily be turned off, thus preventing damage to the system.

Technicians in Sarasota visit the "vac" stations on a regular basis, typically once every day. They monitor the gauges, check lubricants and perform routine maintenance.

The vacuum interface valves at each connection are a marvel of simplicity and functionality. The valve activates pneumatically when the volume of liquid in the sump reaches a specified level, typically about 10 gallons. When the valve activates, the sewage enters the vacuum line followed by a volume of air. Differential air pressure drives the "slug" at a velocity high enough to break up solids and prevent the buildup of grease or sludge. The sewage is carried to the main collection line and on to the vacuum station.

"The fact that the individual valve pits didn't require electricity was a significant factor in our decision process," said Rosser. "There is no worry about the loss of electrical power because the entire system will function just fine with a single backup generator at the vacuum station."

Rosser wasn't the only visitor impressed with the Sarasota vacuum system.

"The Groveland public works officials came away from the demonstration with a higher comfort level with

vacuum sewers," Rosser noted. "They were impressed with the technology and agreed to take over ownership, operation and maintenance of the system once it's installed. We also received solid approval from the Florida Department of Environmental Protection. In fact, they seemed quite excited about the project."

Environmentalists can appreciate vacuum sewers because they are contained systems. Leaks are rare, but if one occurs anywhere in the line, the loss of pressure will set off an alarm at the vacuum station. The leak is quickly isolated and repaired. The opportunity for raw sewage to pollute groundwater or surface water is remote.

No Complaints

The Sarasota experience was enough to convince Rosser that vacuum technology was the right system for the new Waterside Pointe development. The design for Waterside Pointe calls for only one vacuum station to serve 525 homes, and the station will fit in perfectly with the architecture of the neighborhood. Burial depth of the collection lines averages just three-six feet, compared to the 20-foot trenches that gravity lines would have required. Any

last minute design changes can easily be accomplished without field change orders, so the original price estimate for the project will remain accurate.

Rosser also is extremely pleased with the level of service and technical support that Ryland is receiving from the AIRVAC team.

"AIRVAC is doing a fantastic job of educating not only us, but the city as well," said Rosser. "We continue to receive tremendous technical support throughout the installation process."

Ryland is developing Waterside Pointe in four phases. Phase One is anticipated to be complete in June 2007, and work will begin on Phase Two immediately after. The first home to be connected to the new vacuum sewer system is currently planned for July 2007.

"It is getting to the point that easily developed land is hard to come by," concluded Rosser. "We will likely be developing more properties in the future with similar topographical issues to the Waterside Pointe property. From now on

AIRVAC Vacuum Sewer System Advantages

	<ul style="list-style-type: none"> ■ No special house plumbing required ■ Valve is pneumatic...no electricity required ■ The cost of the valve pits can be deferred ■ System operators not exposed to raw sewage ■ Inherently tight system means no infiltration/inflow 	
	<ul style="list-style-type: none"> ■ Vacuum is used to overcome difficult site conditions ■ Small diameter vacuum mains are used ■ No deep excavations required ■ Flexibility during construction minimizes change orders ■ No manholes are required 	
	<ul style="list-style-type: none"> ■ Standby generator ensures uninterrupted service ■ A single vacuum station typically replaces 3-5 lift stations resulting in cost savings and more lots for houses ■ Aesthetically pleasing station structure easily blends with the characteristic of the neighborhood 	

we will absolutely consider vacuum technology for our wastewater collection system. It is a cost-effective solution in circumstances like these." **SLDT**

About the author: Steve Gibbs is a freelance writer in Memphis, Tennessee, who has covered the public works and real estate development industries for the past 20 years.

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