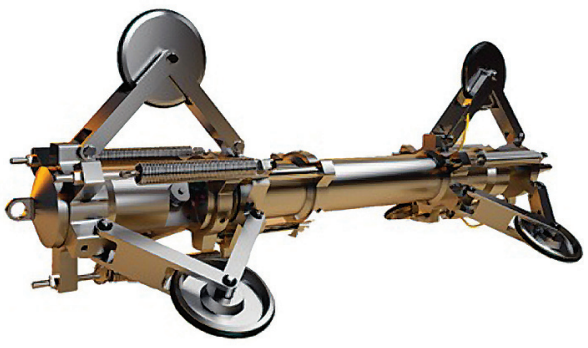
on the map

North Carolina town turns to new technology for water and sewer line mapping

By Mark A. Smith

The town of Oak Island, N.C., is situated along the Atlantic coast and is home to approximately 8,200 people. It covers about 8 sq miles and is separated from the mainland by the Atlantic Intracoastal Waterway. Since its inception, the town has relied on septic tanks. In 2005, the town council decided to install a vacuum sewer system for wastewater collection for the entire island. The island has been divided into nine service areas, each with its own collection system and vacuum station. These stations discharge into a force main network and wastewater is pumped off the island to the West Brunswick Regional Reclamation Facility for treatment.



Pete Monday, a Geospatial employee, at the Oak Island, N.C., site. A pipeline mapping system provided the town with plan and profile reports, as-built drawings and positional data for a vacuum sewer system installation.

Geospatial Corp. was contracted by Black & Veatch Corp. on behalf of the town to perform a project in September 2009 consisting of two phases.

The first of these entailed the forensic mapping of an existing 1,500-ft-long, 12-in.-diameter water line located in the waterway. This line was mapped in order to determine the location of an area damaged during a horizontal directional drilling pipeline installation; at the point where the line was struck, the pipeline had sustained a large hole that required repair.

The second phase of the project performed by Geospatial involved the mapping of a newly installed 900-ft-long, 12-in.-diameter force main sewer pipeline under the Davis Canal, located between the Atlantic Ocean and the Atlantic Intracoastal waterway. This job was done in order to avoid conflicts with other pipelines in the vicinity of the island as the sewer project progresses.

'Smart' Solution

In both phases of the project for the town, the company harnessed its Smart Probe, a proprietary, autonomous pipeline mapping system that is capable of mapping the world beneath our feet in 3-D and at a fraction of the cost of conventional techniques. The Smart Probe accurately determines the location of any and all utility pipes with internal diameters ranging from 1.5 in. to 60 in.

It travels through a pipeline at up to 6 ft per second; as it does so, it records 800 angular and linear velocity changes per second along the X, Y and Z axes. The data acquired by the probe can be stored on a laptop PC or immediately viewed and evaluated in the field. Alternatively, the data can be transferred via the Internet for evaluation, or it can be stored and entered into a GIS/CAD database for future reference.

During the first phase of the project, Geospatial engineers fused a 4-in.-diameter high-density polyethylene (HDPE) liner on site. This was then pushed through the 1,500-ft water line to the damaged area. A Smart Probe was sent through the line and successfully derived an accurate set of X, Y and Z coordinates that will assist when the necessary repairs are made.

In the second phase, once again the Smart Probe was used, this time to map the position of the 900-ft-long sewer line. The probe's readings indicated that this line may have been installed as much as 15 to 20 ft above its intended position. The probe does not move through pipes autonomously. It is either propelled by air or water, or pulled by a guide wire connected to a winch; this latter method was employed at Oak Island. In both phases of the project, Geospatial provided the town with a plan and profile report, accurate as-built drawings and positional data for the pipelines that can be integrated into GIS or AutoCAD.

"Determining this information was critical in two ways," said Troy Davis, wastewater project director for the town of Oak Island. "Mapping the location of the damage of the existing water line was a key step in its repair. In addition, mapping the extent of the new sewer line is critical in preventing costly damage being done to it during subsequent new installations, repairs or excavation."

Davis, who called Geospatial's work "very thorough," said the company required approximately two days to complete the first phase and another two for the second phase. He noted that the Smart Probe was pulled through the sewer line several times in order to maximize the accuracy of the resulting readings.

Precision & Efficiencies

Geospatial's development of its Smart Probe technology—and its ability to format the resulting data

for use in GIS format—was spurred by a challenge faced by utility and construction companies needing to perform repairs or excavations: Very few pre-existing pipelines are mapped precisely, and new lines are sometimes laid down at depths and in locations that differ from specifications. Not knowing the exact location of a line can spell trouble when nearby excavation work is conducted. A few feet in the wrong direction and a vital utility can be severed.

Many of the existing methodologies used to locate structures today along two dimensions are not as accurate, can be more costly and are often time-consuming. Geospatial, with a current roster of clients that includes the federal government and commercial companies and utilities across the country, has developed the Smart Probe as a cost-efficient alternative capable of completing a mapping job within a relatively short period of time. WWD

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