UNDERGROUND INTEL

An RFID infrastructure marking system simplifies the location and mapping of underground utilities.

By Christine L. Grahl

Finding underground utilities has always been a bit of a guessing game. Manholes tend to indicate sanitary sewers are present, and water main valves can provide a clue for the location of water mains. But the pipes don't necessarily run in a straight line from manhole to manhole or from valve to valve. Field crews armed with paper records and GPS equipment often must spend hours measuring from a nearby reference point, such as the side of a road, a curb line, a sidewalk, pole or hydrant, to figure out where the utility is buried—and that process assumes the utility location exactly matches the as-built drawings. The paint or flags used to mark the locations at the surface level are only temporary indicators, and if the reference point is moved–for example, if the road is widened— the information becomes even less reliable.

For the civil engineering firm Ruekert/ Mielke based in Waukesha, Wis., helping clients map underground utilities and track data about their facilities is a major part of business and is a service the firm is always seeking to improve. So when Thomas Tym, principal and senior project manager for the firm, first heard about the concept of using radio frequency identification (RFID) technology to mark and locate underground utilities, he wanted to know more. "Anything that can save time locating utilities and provide better data is a benefit to our clients," he says.

The technology, developed by Berntsen International Inc., based in Madison, Wis., uses RFID markers that are first loaded with data from GIS, Excel spreadsheets, original plans or other sources in the office using software provided with the system. The markers are then buried exactly over the asset during construction backfill or maintenance and provide a digital "data bridge" between the field and the office. The markers are passive, so they don't require a power source, and they can remain underground indefinitely. Magnetic markers such as DEEP1 magnets can be used to mark intermediate points for even greater accuracy. When a line needs to be located, the buried magnetic RFID markers can be easily and accurately found with a magnetic locator. A reader device can then be used to view the RFID tag data and confirm that the asset is the correct one.

Berntsen calls the technology the InfraMarker system. Tym, who has spent more than a year and a half learning about

Using GPS receivers to locate water valves requires accurate records and reliable reference points. RFID markers can be found with a magnetic locator.

and testing the new system, believes it's the next generation of underground utility marking. "The whole idea of technology is to simplify everything," he says. "Using the InfraMarker system gives clients the ability to go right to a point without any type of reconnaissance work or interpretive work, which saves a ton of time. If the utility is buried in an area where it is going to be located often because of ongoing construction, the technology becomes even more valuable."

Cost, he says, isn't an issue. Although the RFID markers are priced at $20 to $30 each, many clients view it as a bargain. "Time is much more expensive than a little device," Tym says.

Tym believes the biggest benefits of the technology will be in identifying utilities in wide-open areas where there aren't many nearby surface features to use as reference points. For utilities that run beneath pavement or concrete, the markers can be buried in a nearby grassy area and used as offsets. "The markers perform well at a reasonable depth under pavement," Tym says, "but using an offset is an easy way to alleviate any concerns."

The bottom line is the ease with which the data can be collected. "Someone with little technical experience can go out there with just a Schonstedt magnetic locator and find the markers without having to know how to operate GPS equipment," he says. "It's a good solution."

Not everyone sees the RFID markers as a positive development. Those whose livelihoods depend on locating under-

ground utility assets, for instance, might feel threatened by the new technology. However, Tym says it all depends on one's perspective. "Technology is dumbing down the way we used to do things, but it's also creating new opportunities, so it's a continuous cycle," he says. "We might not have as many crews going out to mark utilities, but we're developing new applications for our clients to better manage their data in a GIS environment, and we're helping to guide them through that process. So the revenue is still coming in—it's just in a different way."

Anyone who is looking for new opportunities, he says, can find a way to use this change in workflow to their advantage.

The RFID markers contain detailed information that can be verified with an RFID reader.

RFID Aids the Village of Thiensville

Andy LaFond, director of public works for the Village of Thiensville in Wisconsin, was one of the first to embrace the new RFID marker system. The village has a force main that runs for 5,000 feet through both rural and urban areas. The pipeline is made of ductile iron and was installed before tracer wire or detectable underground warning tape was widely available, making it difficult to trace. Without accurate location data, the village couldn't adequately protect the vulnerable utility from damage.

LaFond verifies an RFID marker location in a rural area while Bill Rushing, vice president of research and development for Berntsen, looks on.

The village had worked with Ruekert/Mielke on a number of past projects, so when Thomas Tym told LaFond that he thought a new RFID marker technology could provide a solution, LaFond readily agreed. In 2010, the Village of Thiensville contracted Ruekert/Mielke to locate the line using as-built drawings and survey-grade GPS equipment and install RFID markers. The survey grade data associated with each marker is hosted on Ruekert/Mielke's web-based servers for easy integration with the village's GIS.

The change has been dramatic. "Now our field staff can go out to the field each time and easily find the markers with just a magnetic locator," LaFond says. "They use the RFID reader to confirm that it's the correct device. The RFID system provides a substantial cost savings in locating the utility, and it helps us protect our assets."

As with any new technology, the end game is finding new ways to better serve clients. Increasingly, this means giving clients more control over their assets. "Our clients want access to their data to be able to better manage their facilities," Tym says. "With iPads, smartphones and other mobile devices, the demand for data will only continue to increase. By having the utilities marked with RFID tags and having that information available in the GIS, we can offer greater value."

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