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RFID Speeds Up Roadway Repairs

Dayton, Ohio, is monitoring road cuts to identify utility companies responsible for fixing pavement.

By Michael Belfiore

Tags: [Energy/Utilities](#)

Jun 15, 2014—The City of Dayton, in Ohio, requires utility companies—electric, sewer, telecommunications, water and so forth—that make openings in roads to repair cables and pipes underground to restore the pavement. If the restoration is rushed and not performed correctly, an asphalt patch can deteriorate. Left unchecked, the patch could expand and deepen as the road surface alternately freezes and thaws. It could then become a pothole, a sinkhole or a settled area that not only adds to the wear and tear of vehicles, but also increases accident risk.

A problem may not show up for weeks, months or years after the street cut was made and repaved. When someone files a complaint about a hazardous street cut, it is up to Shane Ward, the lone inspector in charge of Dayton's roads, to determine which of the dozen or so utilities worked on that particular area of street. On average, the city reports, 70 to 100 complaints are investigated annually.



A William Frick RFID wire tag awaits an asphalt covering on a street in Dayton, Ohio (photo courtesy of the City of Dayton).

Until recently, when a complaint about a pothole arrived, Ward had to drop whatever he was doing, head back to his fifth-floor office (if he wasn't there already), fire up a desktop PC and search for a permit number, associated with a particular utility company, at an address near the problem. The process could take hours, and it wasn't always easy to make a match. Permits issued before Dayton created an electronic database would have to be looked up in paper archives, which pose their own level of inconvenience. If he failed to find a permit, workers from [Ohio Utility Protection Services](#) would have to visit the site in question and mark out all utilities within the area. Sometimes, Ward says, utilities would deny it was their street cut. "It was a monumental task, to say the least," he states.

In March 2013, Dayton deployed an RFID solution that monitors street cuts, to quickly and accurately identify the utility company responsible for a repair. "Now, through the RFID program, it's a difference of a few minutes compared to a few hours," Ward reports. The RFID solution reduces the time and cost involved in investigating a problem. In addition, hazardous street cuts can be fixed faster, thereby improving public safety.

Paving the Way

In 2011, Dayton worked with systems integrator [CDO Technologies](#) to deploy an RFID-enabled trash-tracking system to lower the city's recycling costs and boost participation (see [RFID News Roundup: Dayton Recycles With RFID](#)). Robert Zielinski, CDO's director of commercial marketing, serves on the board of directors and the advisory board for the [Dayton RFID Convergence Center](#), a business incubator. "On a quarterly basis or so, the directors from the City of Dayton would come to

the incubator for a 'what-if' session," Zielinski says. "You know, 'We've got a problem with, or here's a nuisance to our system. How might we solve that?'" The problem of tracking which contractors were making which cuts in the city's roads came up at a 2011 session.

CDO proposed a system that could address this issue, and Tim Riordan, Dayton's city manager, signed off on the project. Steve Finke, the city's deputy director of public works, selected Andrew Marks, a civil engineer in training, to manage the project. Representatives from the Civil Engineering Group, tasked with maintaining roadways, worked with CDO during the project's development stage.



A worker for the City of Dayton prepares a road surface for an RFID tag and a second layer of asphalt (photo courtesy of the City of Dayton).

It took several months for CDO to identify a rugged tag that could withstand being covered by 400-degree-Fahrenheit (204-degree-Celsius) asphalt and then compressed by a roller. The tags also had to be readable through 1.5 inches of pavement, and last for years without breaking down under the onslaught of traffic driving over it. Dayton and CDO conducted four field trials to test and verify that [William Frick & Co.](#)'s passive Embeddable RFID Wire Tag was up to the job.

When the city issues a permit to a utility to make a street cut, the company receives one or more tags, each encoded with three crucial pieces of information: a permit number, the date of the planned road repair and a two-digit code identifying the utility company to which the permit was issued. The city's utility engineer employs an [Alien Technology ALR-9650 fixed reader](#), attached to a desktop PC running a custom software application developed by CDO, to encode the tags. CDO also developed an application to manage permit data.

In cases of emergency work—for example, water main breaks, which cannot be scheduled in advance—the utilities have a supply of pre-programmed tags on hand, ready to go at a moment's notice.

After workers on a utility company crew complete their work, they lay down a 1.5-inch layer of asphalt, wait for it to cool, and then place a tag in the middle of the cut. They then lay down another 1.5-inch asphalt layer on top. Small cuts in a road receive one tag, placed as close to the center of the cut as possible, while large cuts require one tag every 50 feet of the cut, with a tag at each end.



Workers prepare to cover an RFID wire tag with a layer of asphalt in Dayton (photo courtesy of the City of Dayton).

If someone later lodges a complaint regarding that section of road, Ward simply visits the site with the Motorola MC9090 handheld reader he keeps in his truck and scans the cut. The device gathers the information that previously required a time-consuming visit to his office, and he can now call the appropriate utility company immediately. If a call comes in about a hazardous street cut while he is at another job site, he can often visit the site of the complaint and return to his job in progress in 10 minutes. "I can run over to the address," he says, "scan it real quick, and then I can be calling [the utility] while I'm on my way back to the job site. Everything's taken care of in that little bit of time."

The greatest challenge to completing the project, Marks says, was getting all utilities to adopt the new system. "Each of them has a different process for how they pull permits in our office," he explains. To get all of the companies and their crews, most of which are contractors, on board, Marks demonstrated how easy it was to use the new system. "We're not making them do ten extra steps."

The RFID road-cut project took 20 months to complete. During that time, the project parameters were refined, several field tests were conducted and city approvals were secured. In addition to software development and installation, the team had to wait for the 2013 construction season to begin. Every year, the city's asphalt plants shut down due to the cold, from late fall to early spring.

Time Is Money

Street cuts made before the RFID solution was deployed will still need to be researched the old-fashioned way. But the city says roughly 2,000 to 2,500 street cuts are made annually.



A utility inspector scanning a cut (photo courtesy of the City of Dayton).

Like Ward, Finke is extremely happy with the RFID project's outcome. "It's not really what I would call an expensive proposition," he says, estimating the program's total cost, including tags, at approximately \$50,000. "We'll get that money back and then some, just in time savings for the utility inspector." A more typical technology project, he notes, might cost the city four times the amount spent on the RFID-powered road-cut project. Dayton initially ordered 2,500 RFID tags. The city has since ordered 10,000 additional tags, and plans to order more as the need arises.

"These sorts of savings may save a guy 20 minutes, but if it happens every day or it happens three times a week, that really adds up over a year," says Matt Joseph, the City of Dayton's commissioner, who has been close to the RFID project. "And at this point, cities like us are looking for every little advantage we can get."

Joseph works in logistics at nearby [Wright-Patterson Air Force Base](#), where he and his colleagues make extensive use of RFID. "I'm not allowed to talk about what I do very much," he says, "but it's safe to say that I work with RFID quite a bit." And while he will not speculate about other potential RFID projects for Dayton, he is quick to share his confidence in the technology's bright future there. "Just like every other city, we've tried to figure out ways to cut costs everywhere we can and still deliver the services that our citizens want—and, frankly, deserve. RFID, in so many ways, can help us do that."

Marks and his team recently expanded the road-cut project to manage temporary repairs made in the winter. Whatever work must be done during those months is paved over with a temporary cold weather asphalt mix, which crews then dig up again to fill with regular asphalt once the weather warms. During the first phase of the current program, the temporary fixes did not receive tags. But Marks and his team began tagging temporary fixes on May 1, with plans to have them tagged in the near future. Ward, for one, is glad to see that happen.



Left to right: Dave Escobar (utility engineer), Andrew Marks (project leader), Shane Ward (utility inspector), Steve Finke (deputy director/city engineer of public works) and Dave Weinandy (chief construction engineer)

In addition, Marks believes that over time, the RFID solution will help the engineering group identify the utilities and contactors that consistently experience issues with their restoration processes. Working with them to improve their practices, he says, could limit the number of complaints and keep roads as safe as possible.

Meanwhile, CDO has created a turnkey solution for other municipalities that is based on the custom solution it created for Dayton. The company's Road Tags will cost less than \$30,000 per implementation, which CDO's Zielinski says could be recouped in less than a year, in terms of in time and cost savings.

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