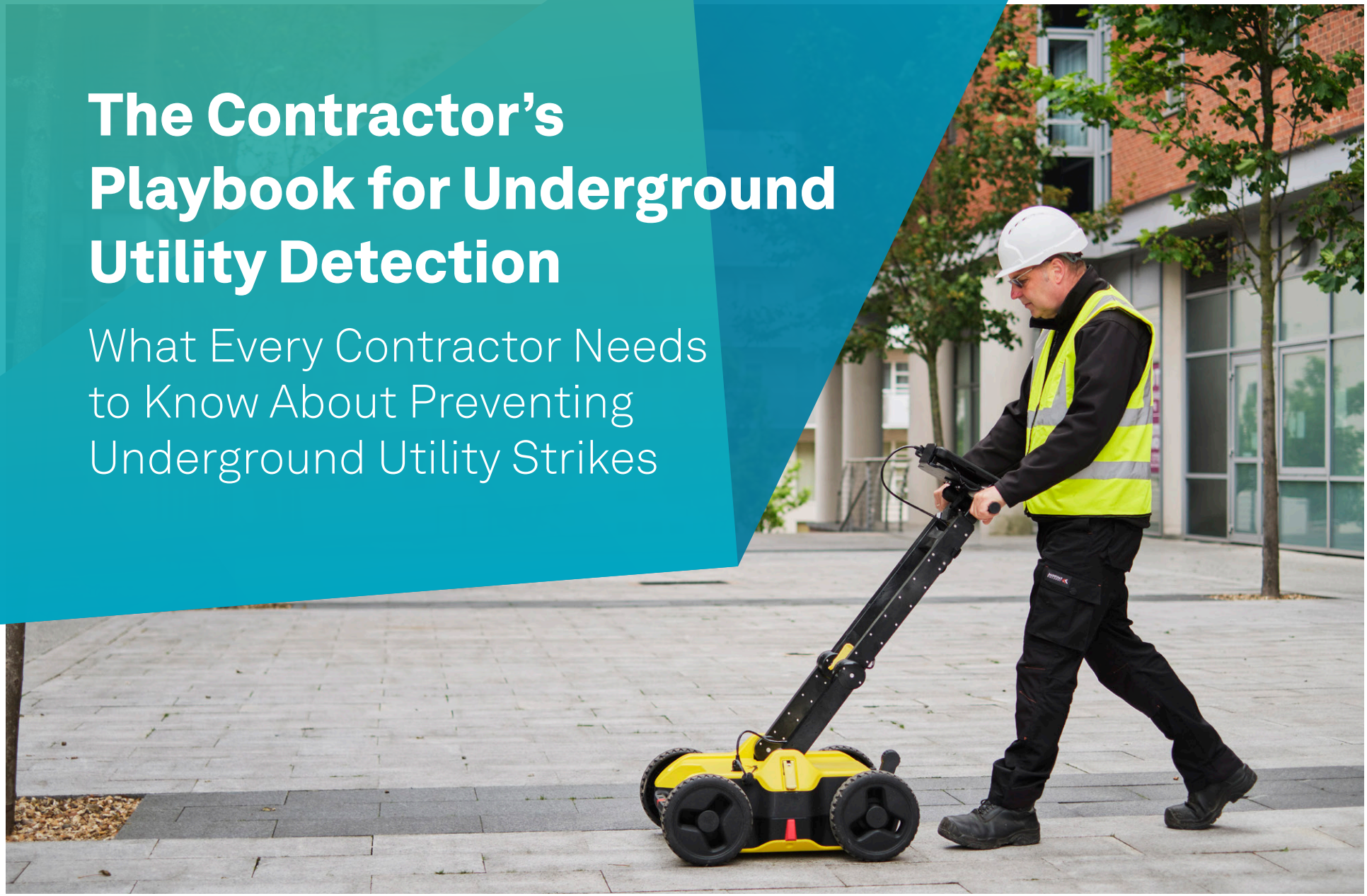
The Contractor's Playbook for Underground Utility Detection

What Every Contractor Needs to Know About Preventing Underground Utility Strikes



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It's believed the first underground utility system was installed in roughly 2500 B.C. in the Indus Valley — a region that straddles the modern-day border between India and Pakistan. There's no record of whether that system was ever disrupted by a utility strike.

Today utility strikes — **accidentally hitting underground utility lines during construction** — are no laughing matter. Entire industries revolve around the art and science of identifying active, abandoned, redundant and unexpected water, electric, gas and telecommunications systems buried underground.

Since its founding in 2000, the nonprofit Common Ground Alliance (CGA) is a member organization dedicated to preventing damage to underground utilities and to educating and protecting those who live and work near them. It estimates that the annual cost of utility strikes is now $30 billion, including direct repair costs, property damage restoration, medical bills, lost business time and other indirect costs.

CGA's widely publicized 811 call-before-you-dig phone number has helped prevent tens of thousands of disruptions each year (CGA call centers receive 35 million annual information requests).

As hard as the CGA, utility companies, municipal authorities and construction contractors work to prevent underground utility strikes, it's not enough. One analysis reports more than 530,000 excavation-related incidents that damaged underground utilities in a single year. Just as alarming, damage to buried infrastructure is on the rise for the fifth consecutive year, despite the fact that 2020 construction activity slowed due to the pandemic.

The good news is, today there are proven detection technologies and strategies that can dramatically mitigate the time, cost and danger of utility strikes.

This playbook looks at how advanced technology is aiding the science of utility detection, helping usher in a new era for construction contractors looking to transform utility detection speed, accuracy and simplicity.

More Documentation Needs to Be Done

Subsurface America is a crowded place.

Telecommunications, electric cables, natural gas and water mains, fiber optics, storm drains, sewer pipes and more are all jostling to claim underground real estate. For nearly a century and a half, increasing numbers and types of utilities have been run underground, often without documentation of any kind. Only in recent years has there been a conversation to map subsurface utilities with global navigation satellite system precision and on-demand convenience.

Until then the construction industry is reliant on standards and practices that are too often hit-and-miss, despite 811 call-in compliance and other mitigation measures. The CGA reports 67% of active diggers say they've contacted 811, though only 38% say they notify 811 all the time. Perhaps that helps explains the continuing risks and dangers of utility strikes:

- 400 U.S. fatalities and 2,000 injuries since 2000
- Every 10 seconds a strike occurs somewhere in North America
- Up to 65% of buried utility lines are private and not subject to disclosure
- Undetermined percentage of subsurface infrastructure is abandoned and unmarked

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CGA REPORT

To help dramatize the personal toll of a strike, a statue was erected in 2020 to honor a fallen Wisconsin firefighter, who was killed in an explosion caused by a punctured natural gas line.

Simon Pedley sums up the state of underground utility detection in five words: "It's not good enough." Pedley is the detection ambassador for Hexagon, a global leader in digital reality solutions, combining sensor, software and autonomous technologies. "It's not just the U.S. Utility strikes are a worldwide challenge. Contractors do care and actively take steps to reduce strikes."

If you've witnessed a jobsite strike, you know about the physical and financial disruption a damaged or severed utility line has on a construction crew and on business. A cut fiber optic cable can easily result in damages and fines in the tens of thousands of dollars. The loss of a workday can top $2,000 or more.

Contractors no longer "accept utility strikes as part of the job," Pedley said. No strike is acceptable. That's why the market for utility detection is expected to reach $1.7 billion by next year.

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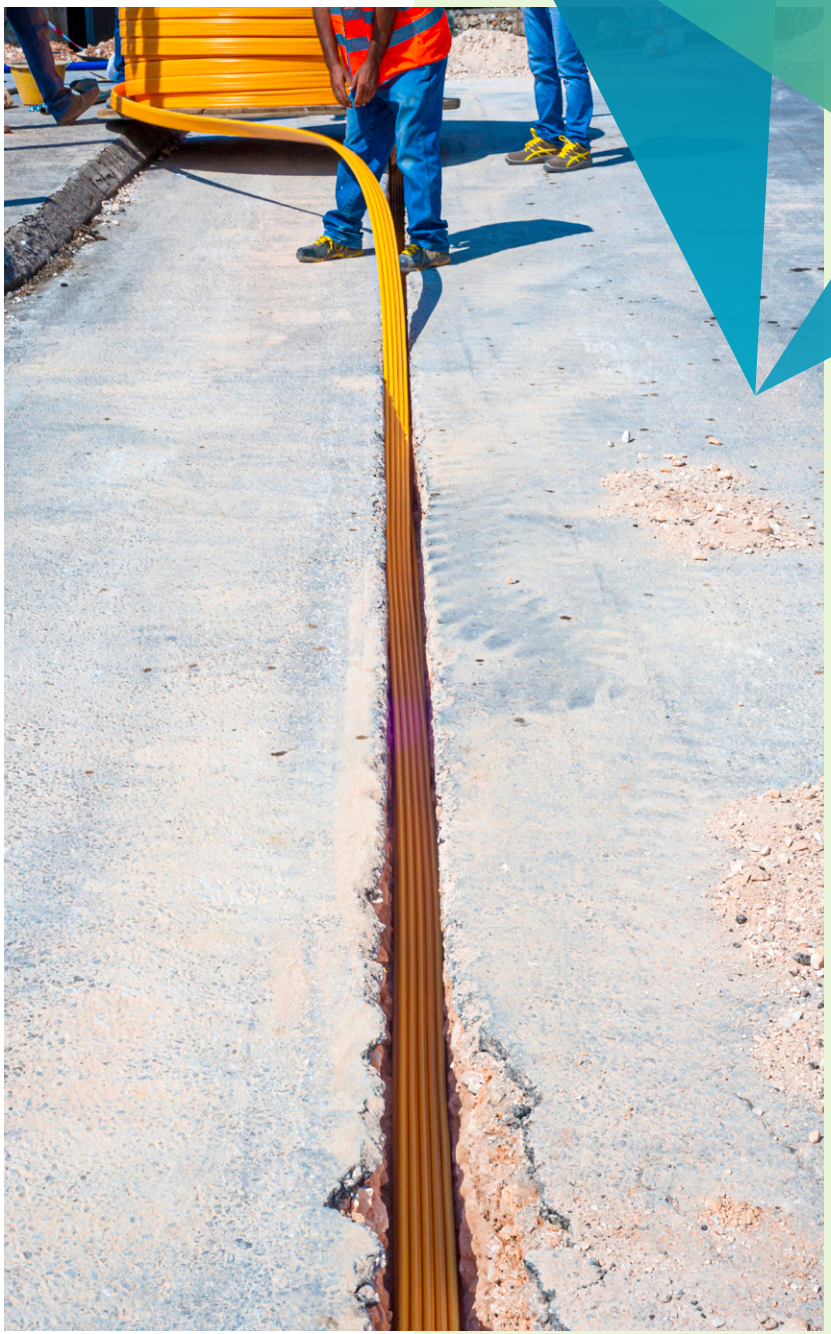


The Challenge of Locating Things Underground

The task of accurately identifying America's vast underground utility infrastructure often falls to utility location technicians, called locators. Locators are busy professionals these days.

CGA carefully monitors the pressures on locators, who are a key line of defense in utility strike prevention. It's recent survey of locator professionals revealed numerous challenges to locator accuracy and speed, ranging from a lack of white-lining the subject area to turnover and a need for more continuing training.

Meanwhile, contractors face their own deadline pressures to meet aggressive project delivery targets. It doesn't help matters when locators are in high demand and may have long scheduling lead times.

That can leave a contractor hanging on critical questions such as: 'Can the jobsite be excavated safely?' and 'Where are the utilities buried and how deep?' Contractors depend on accurate, timely utility location maps to minimize costly infrastructure repairs, fines, litigation and reputation damage. Their reliance on utility locators for those maps often means higher costs to locate existing buried utilities or longer lead times to determine those locations. Many times, both.

The current process for "seeing" underground infrastructure rests primarily on two technologies: electromagnetic locators and ground-penetrating radar.

Both technologies are effective in their own way, but also bring limitations that give each certain advantages over the other. "You want to have both EML and GPR on hand to give yourself the best chance of understanding what's under the ground," Pedley said. "I always suggest using both technologies."

Electromagnetic Locators

Also called cable locators, EML can detect conductive metallic facilities such as power and communication cables or metal pipes. An EML device works is comparatively easy to use and works well for small excavation projects or more complicated route tracing of power, communication cables and metal pipes. However, EML has some limitations, including a notable one: **It is unable to detect non-conductive lines such as concrete, clay and plastic pipes or fiber optic cables**

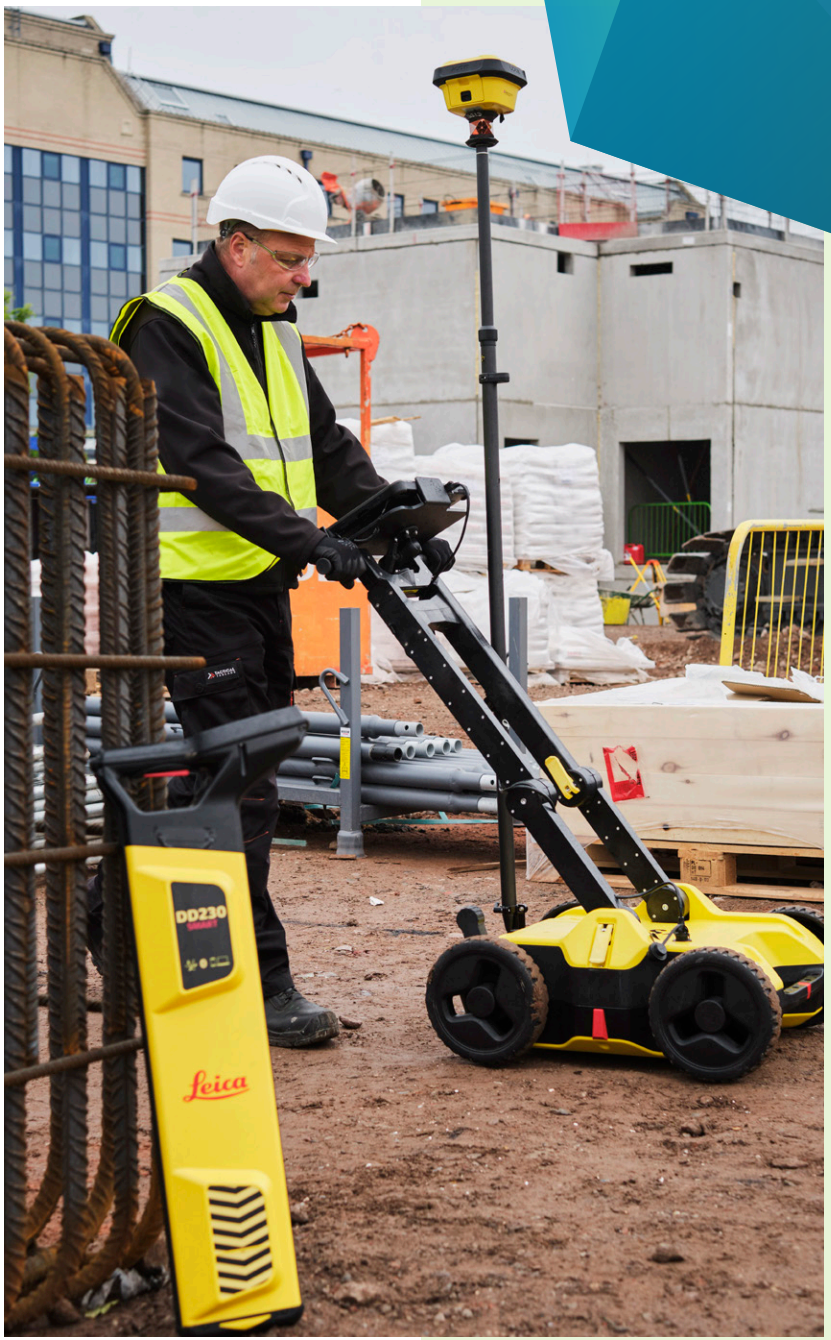
"EML is extremely precise," Pedley says. "The issue for EML, as well as GPR, is there is too much down there. A single technology can't be trusted to capture everything."

Next-generation Subsurface Scanning

Thanks to technology, growing numbers of workflow-minded construction professionals are taking matters into their own hands. Today next-gen subsurface scanning technology is available that sidesteps the usual bottlenecks, costs and project delays while still reducing the risk of a utility strike.

A recent software breakthrough by Leica Geosystems has put accurate GPR radargram analysis in the hands of contractors themselves. Known as the DSX utility detection system, the software converts the hyperbola data into a survey-grade tomographic image that's easily understood and immediately available — no GPR-interpretation experience required.

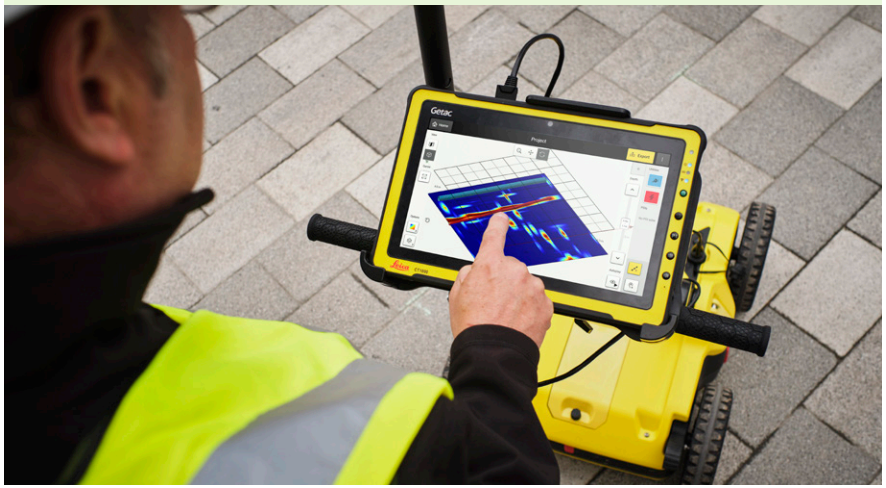
"DSX brings GPR to the masses," explains Pedley. "It's special because no one else offers this capability. The software determines whether what the radar detects is a utility or not. It opens GPR insight to the contractor community without incurring the time and expense for a location company to do the utility verification for you. DSX democratizes GPR."



Ground-Penetrating Radar

The main advantage of GPR is the ability to detect non-conductive materials. That makes GPR devices an ideal companion technology for EML. GPR works by transmitting a signal into the ground from the system antenna. The received signal, or echo, contains information from any target reflection (say a plastic pipe or cable) along the signal path.

Interpreting raw GPR data, which is displayed as a series of hyperbolas, requires a trained geotechnics specialist. This additional post-scanning step typically adds an extra business day to the timeline for locating the buried utilities. “The issue with GPR it that it finds everything underground. What’s relevant? What’s not? Interpretation is key,” Pedley said.



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SIMON PEDLEY
Detection Ambassador for Hexagon

For contractors focused on avoiding strikes, combining the two detection methods makes a lot of sense. No invasive steps like opening trenches or vacuuming potholes, both inefficient and expensive. No working from out-of-date utility maps. No dependence on hyper-busy locators to accurately map their job on a timely basis. Now contractors can proceed with excavation with minimal risk and delay.

The implications of EML and GPR working in tandem are clear: Contractors now have a powerful, more seamless way to *self-perform* utility detection with exceptional confidence.

“Adding underground utility detection to a contractor’s list of services isn’t about payback or an ROI calculation. The reality is, most contractors know exactly how much utility strikes cost them,” Pedley said. “A severed fiber line could easily exceed $100,000 in damages, and they know a strike comes off the bottom line. It’s not a hard sell. Most contractors just want a practical way to reduce strikes.”

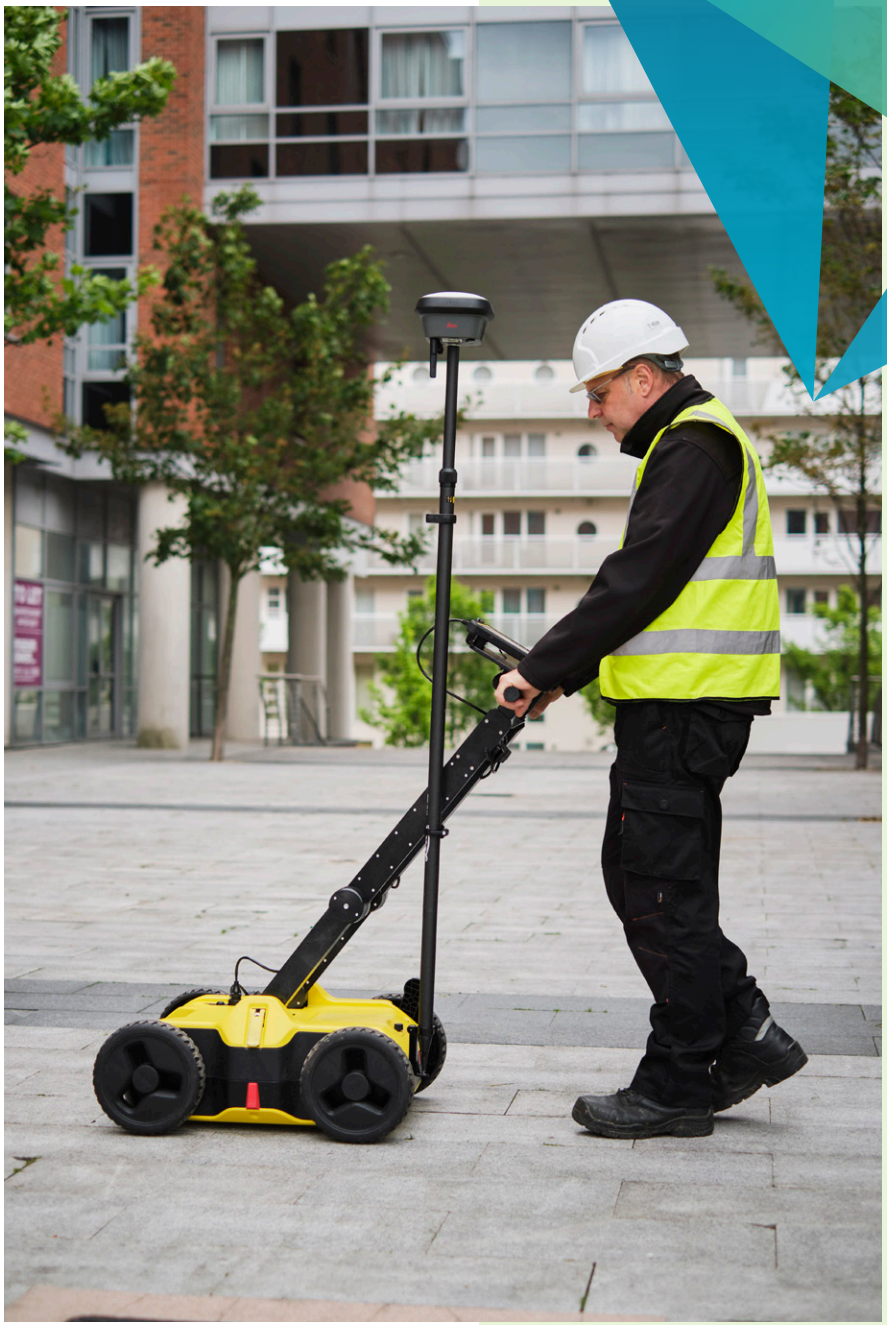
While ROI may not be the principal driver for contractors embracing a comprehensive utility detection solution, it’s good to know the decision to acquire the capability has its rewards. “For every dollar you invest on the front end,” says Pedley, “you save approximately six to seven dollars on the back end. Subsurface utility engineering has a huge return on investment.”

Towards a Utility Strike-Free Workplace

Today, utility strikes continue to happen despite the industry's best efforts to limit them through CGA's 811 compliance, locator services and other due diligence. No contractor wants to jeopardize a job, the health and safety of their crew or their reputation on an inaccurate utility locator map , but with over 200 million miles of underground utilities in the U.S. alone, getting an accurate one isn't always easy.

A new class of subsurface detection devices is helping rewrite the script on safer, more trouble-free commercial excavation. A breakthrough solution like the Leica DSX utility detection solution democratizes sophisticated GPR systems once reserved for the highly trained few. Today contractors can be confident in their own abilities to generate precise on-the-fly insight into subsurface infrastructure.

Unfettered access to state-of-the-art EML and GPR technology is a game-changer for performance-minded contractors looking to advance project workflow on their terms and timetable. As you consider your detection options, keep enabling technology like Leica DSX utility detection in mind. It may be the detection answer you need to help advance your company to the next level.



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Hexagon Heavy Construction solutions provide actionable information that helps you to win, do and close more work, on spec, on time and on budget. At every stage of the life cycle of a construction project, from bid to sign-off; at every location, from field to office; at every level of coordination, from single-job to multi-job workflows, Hexagon's solutions make your work Dirt Simple.

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