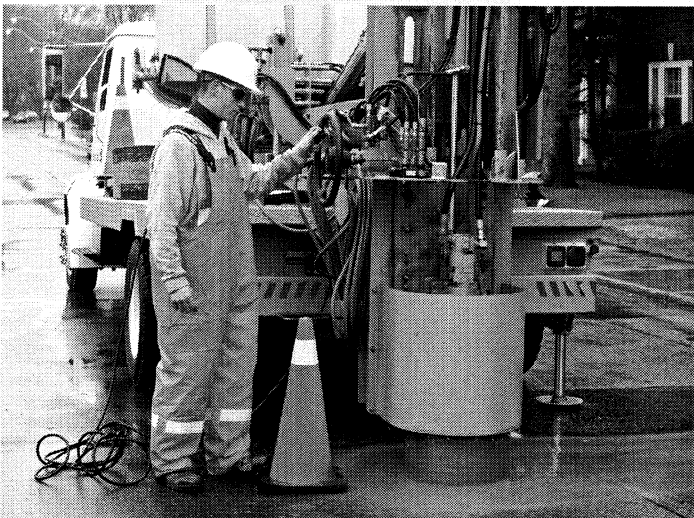




Unlocking savings with an innovative new technology

North American gas companies currently spend more than \$1 billion annually on excavation and restoration of pavements and landscaping to gain access to their underground pipes and equipment. Small wonder they want to know more about an innovative new technology that is reducing overall maintenance costs for Enbridge Gas Distribution.

Keyhole technology – a process developed by Enbridge – deploys circular core cutting equipment to create a pavement opening only 18" (46 cm) in diameter, and then vacuum excavation equipment to remove the soil. Workers use special long-handled tools to make the repairs, then they backfill the excavation, replace the cut pavement section or core, and use a special bonding compound to make the pavement repairs permanent. The work is usually done, and traffic restored, within the day. In addition to drastically slashing the time and disruption of conventional road repair practices, the process provides a virtually seamless replacement of the pavement. And there's no need for repeat visits. The pavement is left stronger than before.



The core cutting equipment is easy to operate and quickly cuts an 18" diameter opening in any type of pavement

Bottom line: Keyhole technology typically cuts excavation and pavement restoration costs by 50 percent, compared to the costs of conventional excavation and restoration.

Exactly why does the process slash costs so substantially? In some ways, Keyhole technology is similar to medical technology. In surgery, small incisions are less intrusive, heal faster, leave smaller scars, and cause less trauma and tissue damage than

large incisions. Small incisions are also less expensive than major surgery: they consume fewer resources in the hospital and during recovery.

Traditional excavation practices, can account for 80 percent of the total cost of a repair job. Utilities must pay for workers operating heavy and often noisy equipment such as jackhammers, backhoes, trucks, pavement breakers, and work with shoring timbers and jacks, steel plates, tamping equipment, backfill material, temporary paving materials, and barricades. They must make large surface cuts measuring about three feet by five feet, followed by the removal and disposal of unwanted pavements and soils – all within the daylight hours utilities have set for digging.

In addition, smaller excavations mean less backfill and paving costs.

"It's all about making smaller incisions, and then using specialized tools and techniques to keep the system operating at optimal efficiency," explains Gord Reynolds, who manages the Keyhole Technology efforts at Enbridge Gas Distribution in Toronto. "In medicine, it is the patient who benefits. In the utility construction industry, there are many beneficiaries. The community and municipality benefit from less disruption and stronger roads, and in the long run, everyone benefits from the reduced costs."

What's ahead? The current applications for Keyhole technology are just the beginning, says Reynolds, "Enbridge is working on technologies that will allow us to install new services through a Keyhole from the road surface, without needing to dig trenches and service pits – this will not only advance the use of Keyhole technologies, but will reduce the costs associated with bringing natural gas to new customers"

A demonstration video of Keyhole technology is available at www.enbridge.com/keyhole.

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