

## CASE STUDY

## Exposing Utilities to the Benefits of Keyhole Technology

Keyhole coring and reinstatement—a trenchless technique for performing operations and maintenance activities through small openings in the pavement—is enabling utilities across the country to realize significant cost savings.



Often compared with microsurgery in the healthcare arena, keyhole coring is a process in which a small core is cut in the roadway pavement to access buried utilities for inspection, repair, maintenance, or installation.

Vacuum excavation is then used to access the pipe and the soil removed from the hole can be reused to backfill the keyhole excavation. After the work is completed, the previously cut pavement core can be restored with bonding material to achieve a permanent restoration.

Utility personnel and the communities they serve are raving about the many benefits of this process—

- Fewer traffic delays and disruption
- Minimal damage to roads
- Reduced environmental impact
- Quicker repairs to underground utilities
- Less impact on customer property and surrounding areas

As the nation's infrastructure continues to age, GTI is working with utilities, keyhole vendors, and other partners to advance acceptance and adoption of keyhole technology and to enhance the role of keyhole excavation techniques in gas operations.



### Putting Keyhole to Work—from Small Service Repairs to the Largest Keyhole Infrastructure Replacement in the World

The list of natural gas utilities that are saving money through the use of keyhole excavation techniques is growing every day. As soon as stakeholders—municipalities, permitting authorities, street inspectors, and businesses—have an opportunity to see keyhole technology in action and its ability to permanently restore the pavement to a smooth, structurally sound, and aesthetically pleasing condition in a matter of minutes, they're convinced that it's the optimum solution for all underground repair and construction work.

**UTILITIES ACROSS THE COUNTRY AGREE:**

**Keyhole is the #1 way to reduce the cost and impact of excavations**

## Extensive Keyhole Operation: Washington Gas Company

*Project: Rehabilitation of 143,000 gas service lines and 1,900 miles of gas mains*

Washington Gas (WGL), a natural gas distribution utility serving more than one million customers in the District of Columbia and Maryland and Virginia, has been using keyhole technology since 2003. At that early stage, WGL used the technology for common processes that included cathodic protection and low-pressure service cutoffs.



**Evolution of the keyhole operation:** In 2008, the company started experimental work to determine the technology's viability for replacement and construction projects. "At the time, crews were using keyhole in areas where we needed to remediate

mechanical joints on the main," says Katie Harkless, Washington Gas project manager, replacement.

Washington Gas keyhole projects received a jump-start when the company started using a tethered camera to internally inspect and identify the precise location of couplings. This helped provide valuable information about where to make the smaller keyhole excavations. Before that, crews used an aboveground locator that was not as accurate.

In 2009, the company began using keyhole for inserting services and, in 2010, completed an aggressive amount of work using the technology. "I'd venture to say that we completed work on 10,000 feet of main and close to 1,000 services," says Harkless.

According to Clayton Munsey, Washington Gas manager of field technologies, a big change came in 2010. "That's when we started planning the projects we were going to do using keyhole, rather than piecemeal, project by project," he says.

Throughout the process, WGL worked with manufacturers to develop service components that fit with their keyhole operation—including development of a single fitting that incorporates a service tee and excess flow valve.

**Crews:** Currently, the company uses outside contractors for all keyhole project work, including all service replacements and encapsulation, while company crews continue to be used for cathodic protection and maintenance functions.

**Bottom-line benefits:** "We're evaluating as we go along, but we are seeing about a 35% cost savings when keyholes are used," Harkless says. "Because a lot of the work we're doing is in Washington, DC, it tends to be more expensive, but we're leveraging the savings wherever we can. We're working on a couple of fittings that will help us be a little more innovative and help us drive more cost savings."

**Advice for utilities considering starting a keyhole operation:** "Put together some due diligence so that you have a good business case to promote it internally and also when you go out to jurisdictions for approvals. Then, set up some pilot projects. And make sure that you have the right people working on the initial pilots so that the cores are set properly and it looks good when they're done," says Munsey.



**Washington  
Gas**



## Starting a Keyhole Operation: Avista

*Projects to date: Customer conversions and service cutoffs*

Headquartered in Spokane, Washington, Avista is a dual-fuel utility that provides natural gas and electric service to about 481,000 customers.

**Research:** Dan Gigler, gas general foreman at Avista, was challenged by the company's director of Gas operations to look at new ways to do things. With the cost of asphalt in Spokane alone nearing \$500,000 a year, Gigler decided to look into the feasibility of keyhole operations and began running the numbers in the summer of 2009. "I figured that, with all the costs of the asphalt patches—and the cost of consumables—with our current contract rates, keyhole would eliminate much of it."

Gigler researched the technology and visited Southwest Gas—a natural gas company that has been realizing significant savings in pavement restoration costs with keyhole—to see their keyhole operation.

After making the case to get budget approvals for purchasing the equipment, Gigler needed to show an internal rate of return. "The fact that keyhole is a 'green' technology was also a selling point," he says. After Gigler achieved internal buy-in, Avista business managers worked with local municipalities and businesses to obtain their approvals. A demonstration for all the stakeholders conducted by equipment manufacturer Utilicor really turned the situation around. "The demo received a lot of buy-in both internally and externally. That was the aha moment," says Gigler.

Since Avista took delivery of the equipment in November 2010, Avista crews have completed four projects, including a customer conversion of a new service in an older neighborhood in Spokane Valley and a plastic service cutoff in Spokane.

"We received the equipment last winter, which is a slow time of year," Gigler says. "As construction starts up, we'll have more opportunities to use it."

As for the crews, says Gigler, "the more they do, the better they'll get. They can cut the holes faster, dig faster, fill the hole faster, and be out of the way faster."



### Other U.S. Utilities Using Keyhole Technology

- Atmos Energy
- Colorado Springs Utilities
- Connecticut Natural Gas
- Con Edison
- Michicon
- National Grid
- Nicor Gas
- NW Natural
- Pacific Gas & Electric
- PECO
- Sempra Energy
- Southwest Gas
- UGI

## About the GTI Keyhole Consortium Group

The Keyhole Consortium Group program provides an arena for information sharing between utilities and manufacturers, while giving utilities a unified voice in the marketplace. Manufacturers can receive feedback and understand the needs of the utilities with respect to keyhole technology through this unified voice. Utilities can efficiently share information among themselves through the Keyhole Consortium Program.

This information sharing, along with testing and development work, creates the driving force that propels keyhole technology forward and expands the capabilities and effectiveness.

### Further Information

For more information about membership in the Keyhole Consortium Group, contact Dennis Jarnecke: [dennis.jarnecke@gastechnology.org](mailto:dennis.jarnecke@gastechnology.org) or call 847-768-0943.



### Keyhole: A Cleaner Process

1. Rotary diamond saw coring provides small circular cuts—18" to 24"—in asphalt and/or concrete.
2. A vacuum truck performs soft dig excavation, eliminating the need for backhoes and dump trucks. (Vacuum excavation also reduces the threat of damage to underground facilities.)
3. High-pressure air and water tools break up the soil, allowing the vacuum truck to remove the soil with a "vacuum" (negative airflow).
4. Maintenance, repairs, or new construction can be performed through the small hole with long-handled tools.
5. Once work is completed, approved backfill materials are compacted back into the excavation and the original pavement core is bonded back in place.