

# Smaller, Circular Keyholes Cut Costs

Improved keyhole technology reduces utility construction costs and disruption.

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**I**n the field of surgery, there has been a great deal of research in orthoscopic microsurgery. New techniques have emerged which use equipment that requires much smaller incisions, yet still completes the required process effectively and properly.



A core-hole cutter makes small street cuts efficiently.

As in medicine, civil engineering has developed innovative methods for maintenance from the road surface through much smaller incisions — keyhole technology. This reduces the disruption to the road user and, also, to the road structure itself.

Companies using these keyhole techniques experience a decrease in costs for specific tasks. A vacuum truck can eliminate the need for several other pieces of equipment such as backhoe and dump truck. The smaller excavation means reduced backfill and paving costs and can mean lesser permit costs. Cost benefit analysis on the investment for vacuum equipment can show short payback periods (two years or less).

While there have been differing needs, the development of keyhole technologies in North America by interested parties have generally followed similar paths. Equipment is typically used for a maintenance operation, and there is also general agreement that accurate location of facilities to be exposed becomes a pressing issue. In conjunction with keyhole technology, there will be a need for location technology that is as accurate as possible.

Development approaches in the topic area have focused on three aspects of the keyhole work. They fall into:

1. Pavement opening and restoration.
2. Vacuum excavation equipment and their safety.
3. Specialized tools to perform the keyhole excavation and maintenance operations.

## PAVEMENT OPENING, RESTORATION

The practice of drilling small holes in streets to carry out routine operations and maintenance work is generally known as keyhole drilling. That means cutting holes that are perhaps 12- or 18-inches round, rather than 3-foot square or larger, as is the more typical practice. One efficient way to make those smaller street cuts is to use a core-hole cutter — actually a form of circular drill — rather than a jackhammer.



A core-hole drill removes the pavement and the worker replaces the removed crown and seals it (top).

Coupon details shown below.

Rather than repaving the excavated area, a utility can replace the small coupon of street pavement that was removed by the core-hole cutter and seal the incision. The aim is a virtually seamless replacement of the pavement — almost as if the job was done by a top plastic surgeon.

#### VACUUM EXCAVATION EQUIPMENT

A practical way to remove the dirt once the small hole is drilled is through vacuum excavation, which works very much as you'd expect. The dirt is sucked up, to be redeposited in the hole when the repair or other operation is completed.

The Gas Technology Institute is also performing work looking at the safety of vacuum excavation equipment when used in the presence of potentially flammable gases. The objective of this project is to determine if ignition of natural gas can occur in vacuum trucks.

#### SPECIALIZED TOOLS

The tools used in keyhole excavation vary with the operation being performed. It is in the area of tasks to be performed (and therefore tools) that most potential is seen for expanded development. While producing a small excavation is important, the ability to perform multiple function activities is essential in order for the whole process to be successful. Most of the development need and work is being performed in this area.

Currently, several construction/maintenance activities can be performed through keyholes, such as:

- Potholing/depth checks.
- Valve box cleanouts and installations.
- PE pipe squeeze offs.
- Meter guard post installation.
- Service cut offs.
- Cathodic protection.
- Cast-iron joint sealing.



- Other miscellaneous leak repairs.

Additional tools and equipment are being developed to perform even more activities through these smaller openings.

GTI undertook a keyhole consortium project with 14 utilities to analyze the current status of keyhole tools and processes and provide input into where development of new tools and/or processes is needed. While major keyhole technology development efforts have been made by individual utilities and local contractors, the resulting tools tend to be custom made, expensive, and difficult to obtain. The GTI keyhole program will, through its participants, analyze the current status of tools and equipment and determine where further development needs are required.

Many benefits can be seen from using smaller openings to perform everyday activities on our natural gas facilities. One of the major benefits can be seen in a drastic reduction in pavement restoration costs. By using the coring process to open and restore the pavement, over a 50% reduction in cost can easily be obtained. Combine this with lowered operation and maintenance costs, decreased generation of spoil, improved aesthetics, and an overall improved customer satisfaction it is very evident to see the benefits of these keyhole activities. **GTM**

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