

Agents of Change: How keyhole technology became a standard in the Valley of the Sun

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Last fall, the Maricopa Association of Governments (MAG), a regional planning agency for the metropolitan Phoenix, Arizona, area, approved keyhole technology—a process that encompasses coring, vacuum excavation, backfilling, and reinstatement of the pavement core—as a general construction standard for making and restoring utility cuts through asphalt pavement.

That's good news for utilities and contractors throughout the region. "Contractors prefer to have one set of details or specs in their truck, versus having a pile of them to refer to when they're doing work here in the Valley," says Warren White, Principal Engineer for Chandler, Arizona, a suburb of Phoenix and MAG member. "It makes it easier."

Why keyhole?

Adoption of the coring and replacement process is another example of how U.S. right-of-way owners are beginning to see the light about the benefits of keyhole. The process is simple: A small, precisely controlled hole is cut in the roadway pavement to open the street surface and perform underground facility inspections, depth checks, and repairs with specialized, long-handled tools. Once the work is completed, a special bonding material is used to replace the previously removed cored road surface.

A technology that's been around since the early 1990s—with more than 50,000 cores cut and reinstated throughout North America—keyhole has long been recognized by utilities for its cost- and time-saving benefits. In recent years, many municipalities

have developed specifications for using it as a standard practice for work performed on city streets (some have even mandated its use) because of the many benefits it offers for their jurisdictions and the traveling public:

- It's a fast process—usually completed in an hour or less.
- It creates fewer interruptions to traffic and inconveniences for drivers (including the disruptive noise of jackhammers).
- The road cut is small compared with traditional excavations.
- Because it is circular, the cut prevents cracking at the corners.
- Results are long lasting and aesthetically pleasing.

Southwest Gas, a natural gas utility serving customers in the southwestern United States, uses the keyhole coring and reinstatement process throughout its operating system. According to Byron Elkins, Director of District Operations in the company's Carson City, Nevada, office, Southwest Gas has realized many benefits from the use of the keyhole process. "We don't have to send our employees into the excavation, it's cost-effective, it's environmentally friendly, and it results in a much more durable and permanent repair that is pleasing to the public and the regulatory agencies," he says.

In 2009, in an effort to bring its success with keyhole to the Valley of the Sun, Southwest Gas began the process of spreading the word to key decision makers in Phoenix, Scottsdale, Chandler, and other MAG member cities.

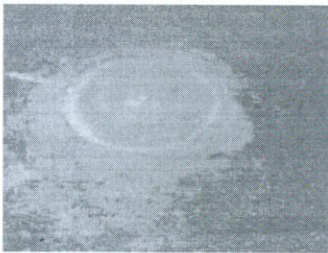
MAG standards

Among other things, MAG is the designated metropolitan planning organization (MPO) for transportation planning in the Maricopa County region. Formed in 1967, MAG now comprises a membership that includes representatives from the Arizona Department of Transportation, Maricopa County, as well as the 25 cities and towns within Maricopa County.

The Standard Specifications and Details Committee is a MAG Technical Advisory Committee of 16 members from MAG member agency engineering departments and the construction industry. "The committee is a group that represents 15 cities, and eight advisory members representing various construction-related organizations," says Troy Tobiasson, the current committee chair. "At this time, we have five active working groups—concrete, materials, asphalt, water and sewer, and outside right-of-way."

The committee makes recommendations on proposed amendments to the *MAG Uniform Specifications and Details for Public Works Construction*, a hefty manual that now includes nearly 800 specifications and detail drawings covering everything from traffic controls to sewer line construction and telecommunications and utilities installations. This publication can be accessed at the "Publications" page on the MAG website (www.mag.maricopa.gov). Look for *Uniform Specifications for Public Works Construction*.

"MAG standards are written to be inclusive of different techniques and processes," Tobiasson continues. "The



Wide view of completed keyhole in Phoenix, Arizona—43rd Ave. and Glenrose

ity had its own approval process. Some had a specifications committee, others were giving a verbal approval—and we didn't know how long that approval would be in effect if a new public works director came along."

Meeting Warren White, Principal Engineer for the City of Chandler, changed everything. When Southwest Gas approached Chandler about the keyhole process, White was interested right away. "They said they'd had good results in other cities," says White. "And I had heard positive feedback from other MAG member agencies like Queen Creek and Scottsdale, who told me that they had tried and liked it," he says.

"So, we did a pilot project in a road-way that had a lot of traffic and it went great. In fact, driving by a month later, you couldn't even detect where it was. Our streets department liked it." Rather than creating a unique design standard for Chandler, White's recommendation was to get the process adopted by MAG.

Navigating MAG

The team began attending monthly MAG meetings to provide information and gain support for the new specification. "We did a lot of research about what was already in place in cities like Toronto," White says.

White was soon joined in developing the new specification by Peter Kandaris, Senior Principal Engineer with Salt River Project, a water and power utility. "Because of my knowledge about how to navigate through the

process, they came to me and asked me to help them put the specification in a format that would meet MAG requirements," Kandaris says.

"Peter is an especially active longstanding member of the committee and a valuable asset in developing cases for the committee to review," says standards committee chair Tobiasson. "It's through the hard work of people like him that we are able to keep the specification up-to-date and develop cutting-edge new ones."

In early 2010, the team made a formal presentation to the MAG Specifications Committee, in which they described the keyhole restoration process and responded to questions and concerns about mechanical compaction and the bonding agent. "Over the course of the next five months, everyone had a chance to review the proposed keyhole specification. They took it back to their own agencies and passed it around so that everyone could make comments," White says.

As the team continued to gather feedback and shore up support for the process, White and Kandaris worked together to develop the final keyhole specification and detail, and by the fall of 2010, they were ready to present it to the MAG membership. At the MAG meeting in September, the specification was unanimously approved and can now be found in the specification documentation in Section 355 (Utility Potholes—Keyhole Method) and Section 708 (Bonding Agent), along with Detail 212.



Another completed keyhole demo for MAG member Gilbert, Arizona—Greenfield and Winchester

Since last fall, it seems, no news is good news. "I haven't heard anything from anybody on the MAG committee, which is good, because if there were any concerns, we would have heard," says White.

White is pleased that his and surrounding municipalities will now have a standard alternative method of utility cut restoration. "A lot of cities are adopting keyhole," White says. "We took it further to make it a Valleywide standard."

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Want to know more about keyhole?

- You can view the entire final MAG keyhole specification and detail package at: http://www.azmag.gov/documents/pdf/cms.resource/case10-02_keyhole_repair-3-3-1081185.pdf
- Access the introduction to keyhole that Southwest Gas presented to MAG at: <http://www.azmag.gov/documents/pdf/cms.resource/keyholetechnology-magpresentation89899.pdf>
- Gas Technology Institute (GTI), a leading research and development organization serving the natural gas industry and energy markets, and members of its Keyhole Consortium Group, have also created a "universal" Keyhole Pavement Coring and Reinstatement Specification based on the specification developed by MAG and other agencies. The GTI specification is intended to provide a specification for acceptance by DOTs and other right-of-way authorities throughout North America. A copy of this publication can be accessed at www.gtikeyhole.com.

committee has monthly open meetings that allow comments from the public and industry representatives. We encourage experts and interested parties to attend the monthly meetings and to participate in working groups where input can lead to cases reviewed by the committee."

Keyhole heats up

Beginning in 2007, a team from Southwest Gas public affairs and gas operations support began approaching MAG members with the message about the benefits of keyhole. Phil Cisneros, Superintendent of Southwest's gas operations support staff, and Ann Seiden, an administrator from the Southwest Gas public affairs office, kicked off their campaign to raise awareness about the technology by providing first-hand demonstrations to individual cities and towns. "We'd tell them to pick a street that has lots of traffic, let us core a hole, and then watch it over a period of time and see what you think," says Cisneros.

"With keyhole, we were able to go out and block out a portion of the street, go in with our equipment, core through the blacktop, vacuum down to our facility, make our repair, backfill, and reinstate the core. In a half hour, we'd



Pilot keyhole project in Chandler, Arizona
(photo credit: Warren White)

drive away and the street would open back up." One demonstration was actually completed on a busy street in front of the Chandler City Hall building. "Their engineers could walk by on their way to work every day and see how our keyhole restoration held up," Cisneros says.

Eventually, the Southwest Gas team completed pilot cores and presentations for Maricopa County, Phoenix, Scottsdale, Gilbert, Chandler, Tempe, and Surprise. However, after a few months, the process of making individual presentations became cumbersome, according to Seiden. "We quickly realized that each municipal-

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