

## Keyhole Demo during WaterRF Project in LA

During an evaluation project by the Water Research Foundation (WaterRF)—an association with over 950 water utility subscribers in the U.S., Canada, Europe, Australia, and northern Asia—to investigate non-destructive examinations (NDE) technologies for ferrous water mains, a demonstration of installing anodes through keyholes was conducted for the Los Angeles Department of Water and Power (LADWP).

“Today’s demonstration was successful, interesting, informative, and impressive”, stated Dan Ellison, Senior Professional Associate at HDR Engineering, Inc and research lead for the WaterRF project. “Thanks go to **Utilicor, Southwest Gas, Badger Daylighting, the Gas Technology Institute, and LADWP** for the many services they provided.”



Various keyhole methods were demonstrated, including:

- Coring an 18-inch diameter hole in the pavement
- Vacuum excavating to expose the pipe and to bury an anode well below the pipe
- Temporarily covering the hole with a light-weight traffic plate
- Using keyhole tools to cadweld® the anode wire to the pipe
- Restoring the roadway by bonding the cored pavement section back into the hole
- Preparing 3 other keyholes using coring/vacuum excavation for use during the NDE investigations.

Below are annotated pictures showing what occurred during the keyhole demonstration.



LADWP staff witnessing the demonstration estimated that the use of these methods could double their productivity in anode installation,” says Ellison. “Additionally, the work is less disruptive to the community, results in better pavement restoration, and is safer than traditional methods.”

“One strategy for dealing with managing corroding iron or steel pipe is to install anodes, as was demonstrated today,” says Ellison. “The City of Calgary does this already, scanning a portion of their old mains every year, selecting some for anode retrofits and others

for replacement. Calgary credits this program for a 50% reduction in their annual break rates over the last 15 years. The savings have paid for the program twice over.”

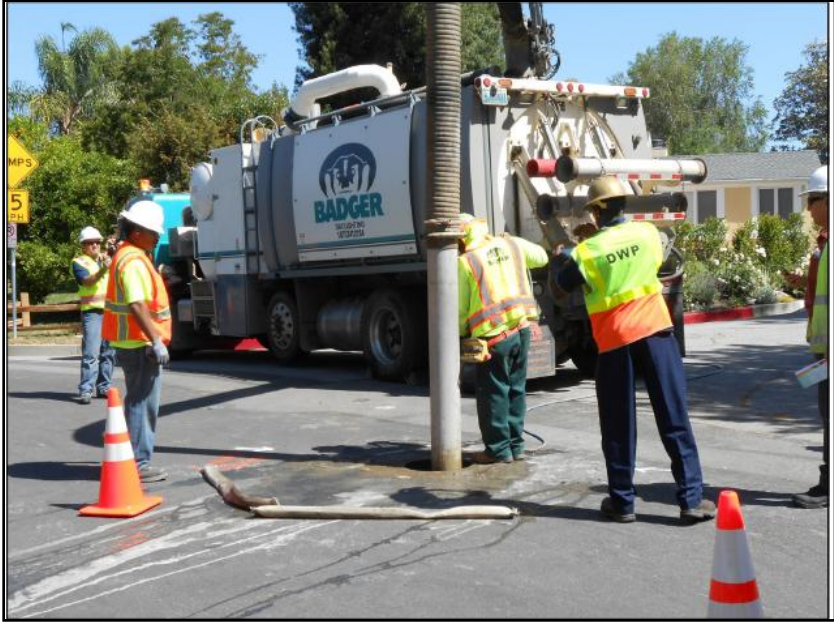
**Photos from anode installation through a keyhole for LADWP**



Coring the pavement to expose the steel water main



Extracting the 18" diameter core from the pavement



Vacuum excavating to expose the steel water pipe



Exposed 6" steel water pipe



Anode being installed in the excavation below the steel water main



Long-handled tools used to grind away the pipe coating, cadweld the wire to the pipe, and re-coat the pipe and exposed wire



Anode installed in keyhole and coating replaced on pipe



Replacing the pavement core for a permanent roadway restoration



Restored pavement core open to traffic after 30 minutes