

A Cost-Saving Strategy for Installing and Maintaining Gas Facilities

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KEYHOLE TECHNOLOGY

What is Keyhole?

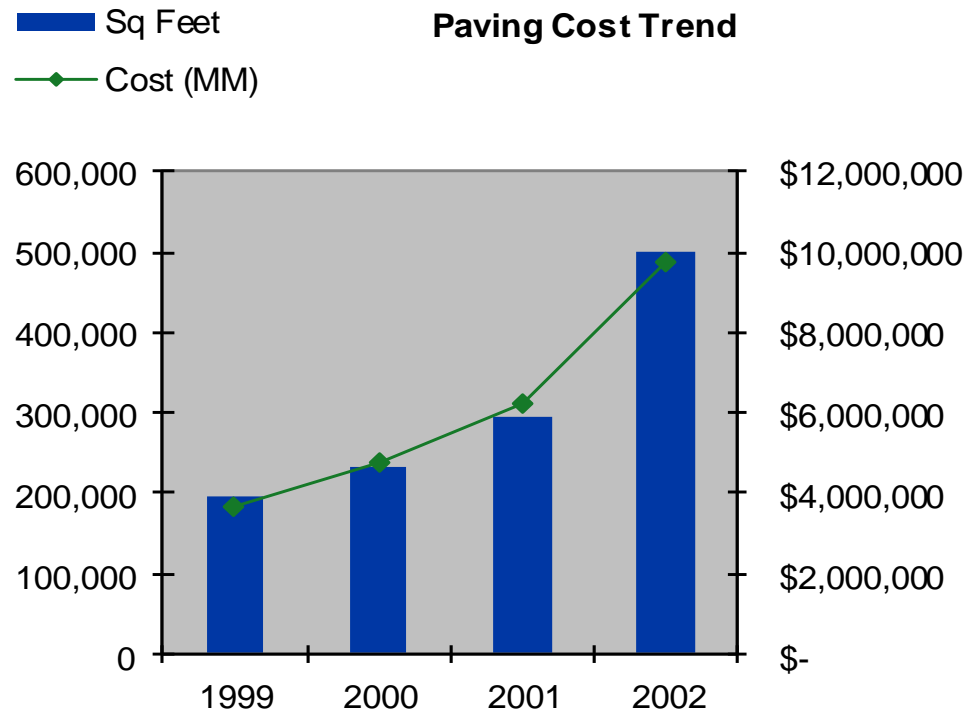
- > Method of accessing or viewing underground utilities through small holes or “keyholes”
- > Keyhole coring excavates the pavement and vacuums the excavation to expose the utilities



KEYHOLE TECHNOLOGY

Opportunity

- > Every year, over **\$2 billion** is spent on excavation and restoration
- > Conventional excavation activities can account for as much as **80% of cost**



KEYHOLE TECHNOLOGY

Cost Savings

~\$1,000 per excavation in pavement restoration cost savings



SOUTHWEST GAS

Coring and reinstatement greatly reduces paving restoration costs

- > Pavement Restoration Costs per mile of plastic pipe replacement:
 - Open Trench: \$200,000 per linear mile
 - Keyhole: \$26,400 per linear mile
 - Savings (87%): \$173,600 per linear mile of replaced pipe

nationalgrid

System-wide keyhole savings on Repair and Maintenance work

- > 2011: 5,000 keyholes cored—\$5 million restoration cost savings (average \$960)



Washington Gas

Rehabilitating 143,000 gas service lines and 1,900 miles of gas mains

- > Savings 50-80% in pavement restoration costs

KEYHOLE TECHNOLOGY

Political and Environmental Advantages

- > Reduced work zone delay and disruption
 - No jackhammers noise and dust
 - 30 minutes to gain strength
 - No additional road closings
 - Permanent repair
 - No repaving
- > Reduced pavement damage
 - Precise cut
 - No pavement breakers or backhoes to damage rest of pavement or crack the concrete
 - No potholes
 - Longer pavement life
- > Reduced impact on environment
 - Reduce-Reuse-Recycle
 - Saves resources
 - No disposal
 - Reduces carbon footprint
- > Aesthetically more pleasing result
 - Fewer citizen complaints

Municipalities have recognized coring and reinstatement as a valuable construction standard



KEYHOLE TECHNOLOGY

Applications

- > Expose underground facilities and perform necessary work



KEYHOLE TECHNOLOGY

Potholing for HDD-Cored Openings

- > One contractor performed over 2,500 cores in 2006
- > About 80% are for inspection purposes only



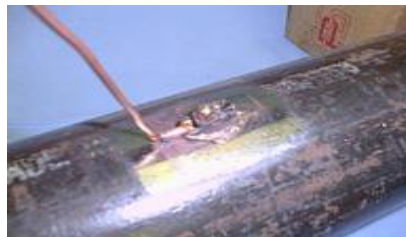
KEYHOLE TECHNOLOGY

Cast Iron Joint Sealing–Encapsulation



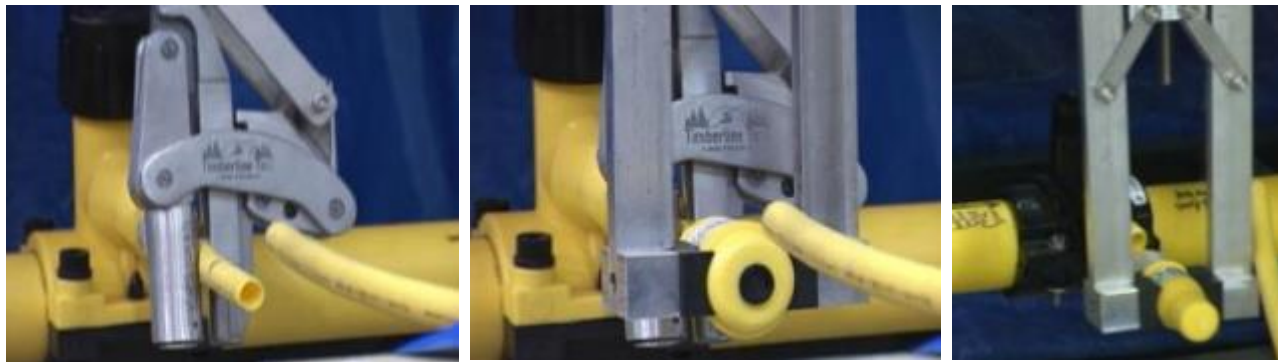
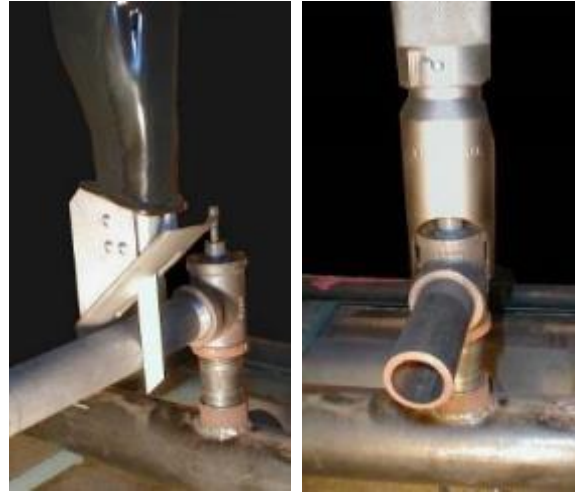
KEYHOLE TECHNOLOGY

Cathodic Protection



KEYHOLE TECHNOLOGY

Steel and PE Service Abandonment



KEYHOLE TECHNOLOGY

Valve Maintenance



KEYHOLE TECHNOLOGY

Vintage Service Renewal



KEYHOLE TECHNOLOGY

PE Service Installation



Fuse 2"X1/2" plastic tee



Connect 1/2" tube to service tee



Soap test new service connections



Completed service transfer

KEYHOLE TECHNOLOGY

PE Main Replacement–Pipe Splitting



KEYHOLE TECHNOLOGY

Camera Inspection on Live Mains



KEYHOLE TECHNOLOGY

Completed Repair



Almost Invisible

CORING AND REINSTATEMENT

The Municipal Myth of Utility Cuts

“There is no such thing as a GOOD utility cut repair”



CORING AND REINSTATEMENT

Municipal Myth Buster



CORING AND REINSTATEMENT

Why a Cored Keyhole?

Smaller is better and less intrusive

- > Laparoscopic surgery
 - Smaller incision
 - Short recovery period
 - Faster healing
 - Smaller scar
 - Lower cost

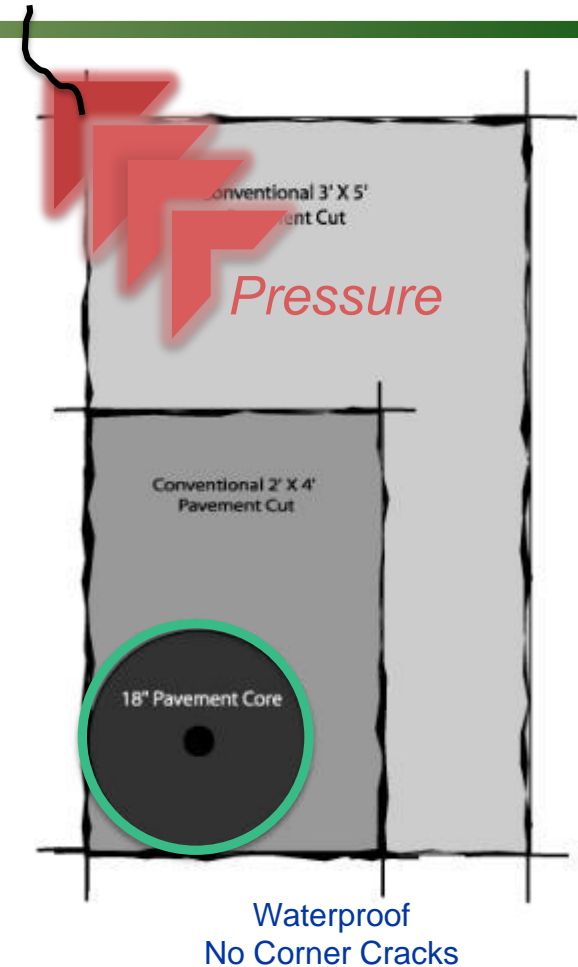
- > Keyhole operation
 - Smaller opening (keyhole)
 - Faster restoration
 - Less damage to road system
 - Smaller repair footprint
 - Lower cost
 - Safe—no men in the hole



CORING AND REINSTATEMENT

Benefits

- > Better excavation method
 - No jack-hammers/back hoes—less disturbance
 - Environmentally friendly, reuses materials, creates no spoils and no VOCs
- > Size and shape
 - Less than 1/10th size of conventional restoration
 - Reduced surface scarring
 - Circular geometry with no corner cracks
- > Proven strength
 - No failures
 - Reinstated core will support 50,000 lbs
- > Greater satisfaction
 - Reduced delay
 - Reduced pavement deterioration—no potholes
 - Reduced traffic delay—no additional road closing for repaving; in and out the same day
 - Aesthetically pleasing—perfect surface match; invisible
 - Safer for workers and public
- > Safer for workers and public

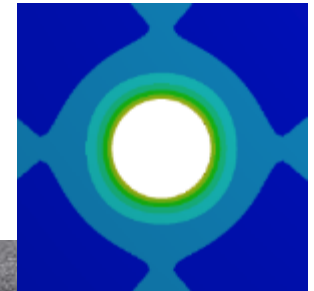
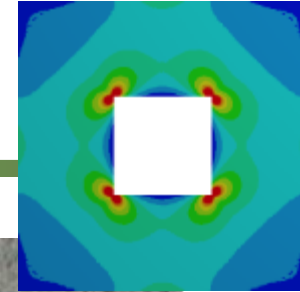


CORING AND REINSTATEMENT

Shape is Important

> Rectangle vs. circle

- Rectangular format concentrates **4x traffic pressure** in corners than circular format, causing corner pressure cracks that allow water penetration

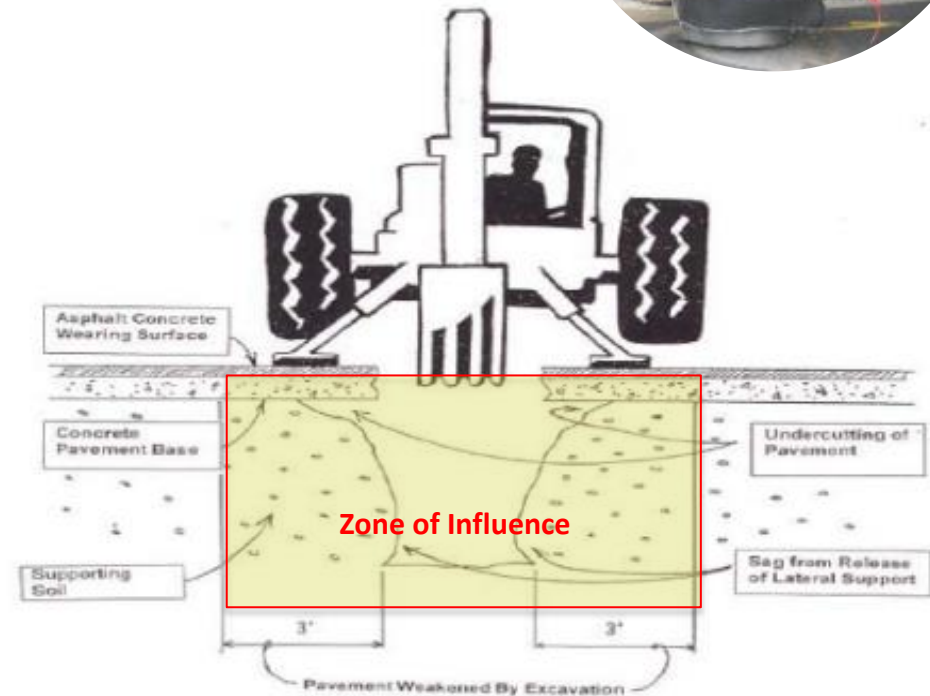


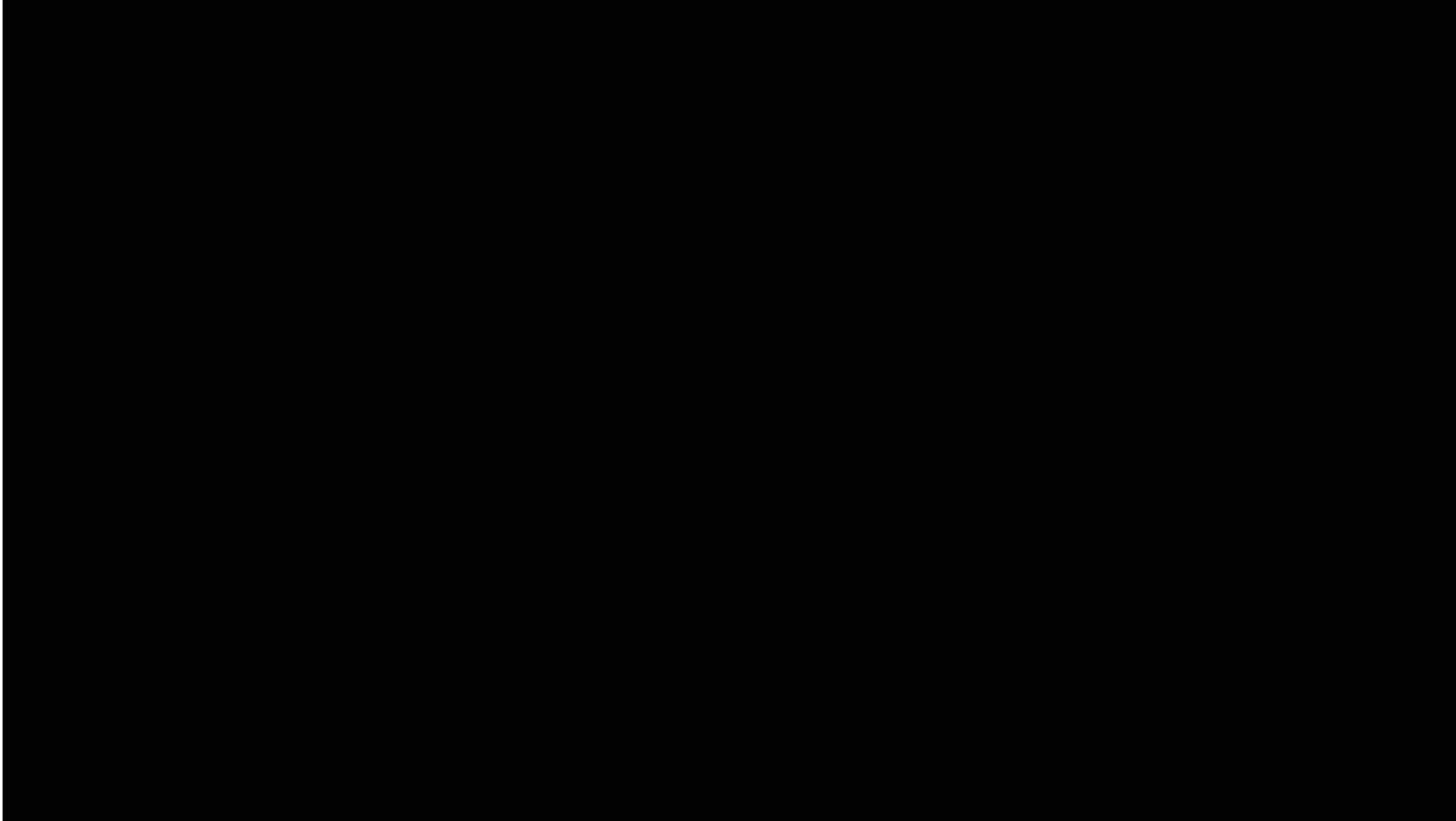
CORING AND REINSTATEMENT

The Importance of the Cut



- > Conventional excavation weakens pavement well beyond the cut causing subsidence in “Zone of Influence”
- > Precise coring operation minimizes or eliminates “Zone of Influence” and reduces pavement damage





CORING AND REINSTATEMENT

The Process

1. Core is removed with a core puller and set aside
2. After vacuum excavation, the work is performed with long-handled tools



CORING AND REINSTATEMENT

The Process

3. A layer of pea gravel is used to level out the base and the Utilibond™ is mixed with water and poured into the hole
4. Reinstatement of the core
5. Leveled to the surface



CORING AND REINSTATEMENT

The Process

6. Completed Repair

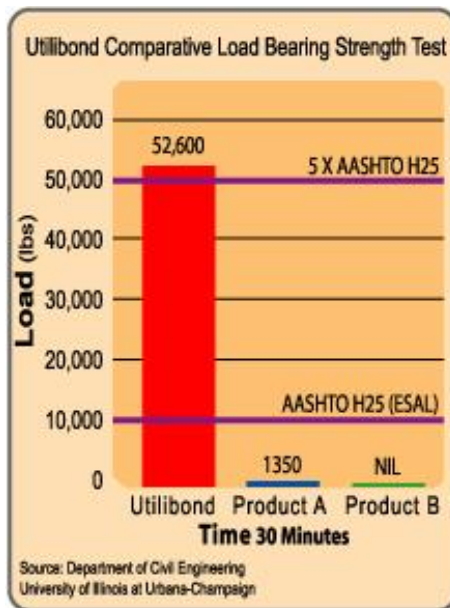
- Utilibond™ sets-up in 10-15 minutes
- Bond gains sufficient strength in 30 minutes to support equivalent load equal to five transit buses
- 5 times the AASHTO standard or over 50,000 pounds
- The road can be safely reopened in 30 minutes with no subsequent road closings or repaving required



CORING AND REINSTATEMENT

Bond Strength

- > Utilibond is the **only** bonding compound that gains full strength in 30 minutes and is stronger than the pavement



University of Illinois Urbana-Champaign



* Construction Technology Laboratories. An AASHTO Accredited Laboratory

ADVANTAGES

Utility or Contractor

- > **Improved appearance**
- > **Saves money**
 - Reduced paving budgets
- > **Positive community relations**
 - Faster, less intrusive process
 - Fewer complaints from neighbors or municipalities about traffic disruption, noise, unsightly road cuts, sunken patches or weakened or failed roads
- > **Improved logistics**
 - Single crew, one-stop, same-day coring and reinstatement means simplified scheduling
 - No temporary patching or repaving
 - No repeat visits
 - Works in cold weather—longer season
- > **Field-proven process**
 - Zero reported failures in more than 15 years
 - Over 250,000 successful corings in tough urban climates



ADVANTAGES

Municipality and Public

- > **Improved appearance**
 - Almost invisible, matching circular core
 - Less than 1/10 the size of conventional road cut
- > **Improved pavement performance saves tax dollars**
 - Road restored to original design specification
 - No sunken patches or weakened or failed roads
 - No potholes
- > **Cleaner, safer, less intrusive worksite**
 - No jack-hammers or large excavation equipment— less noise and mess and reduced disruption for neighbors
 - No spoil trucked through city
- > **Fewer complaints from public**
- > **Reduced traffic disruption**
- > **Improved logistics**
 - Immediate restoration



ADVANTAGES

Environmental

> Environmentally friendly

- No noisy and dusty pavement breaking machines
- No temporary patching compounds with volatile organic compounds (VOCs) to escape into the atmosphere
- No wasteful T-section cutbacks needed

> Reduce-reuse-recycle

- No new asphalt or concrete paving materials required
- No pavement spoil to be disposed of in dumps

> Reduced carbon footprint

- Coring involves 2 pieces of mechanized equipment vs. up to 8 or 10 (2 trips) for conventional method—
1/6 the amount of carbon emissions

> Fewer and shorter road closings

- Less traffic disruption, fuel wastage and increased pollution from idling engines



Connect With Us

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