



INFRA 2014

CONGRÈS | 20^E ÉDITION



Vers une nouvelle dynamique municipale
pour une urbanité durable

A Core Strategy for Pavement Saving Utility Cuts

by

Utilicor Technologies Inc.



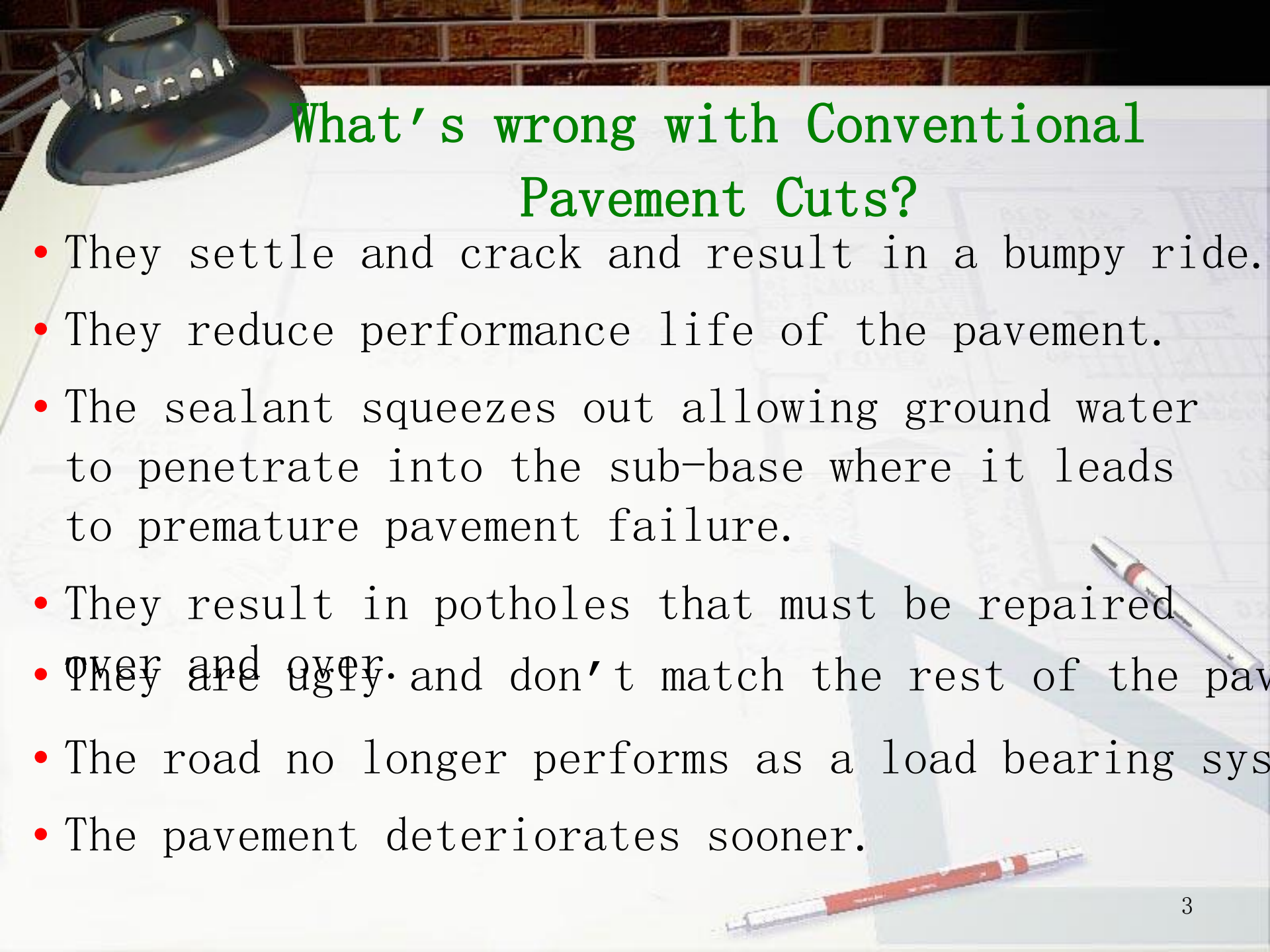
Montreal Quebec
Canada

December 2nd, 2014



Outline

- Problems with Conventional Utility Cuts
- Keyhole Coring & Reinstatement – A Better Way
- Mechanics of Excavation:
 - Size, Shape, Cut and Repair Methods
- Field Proven Repair Method
- Keyhole Technology Applications
- Proof of the Process and Testing
- Environmental Benefits – Reduced Carbon Footprint

A desk lamp with a blue shade and a red pen on a white surface. The background is a brick wall.

What's wrong with Conventional Pavement Cuts?

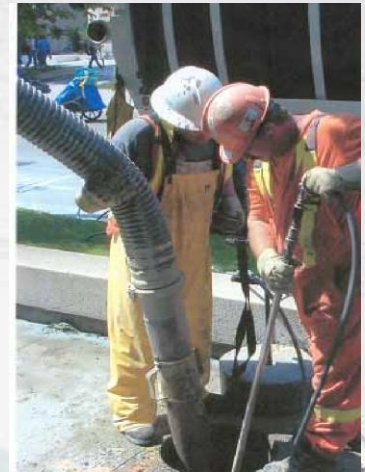
- They settle and crack and result in a bumpy ride.
- They reduce performance life of the pavement.
- The sealant squeezes out allowing ground water to penetrate into the sub-base where it leads to premature pavement failure.
- They result in potholes that must be repaired over and over.
- They are ugly and don't match the rest of the pavement.
- The road no longer performs as a load bearing system.
- The pavement deteriorates sooner.

Leading to the Conclusion

"There is no such thing as a Good Utility Cut Repair."



But there is a Better
Way ...
Keyhole Coring & Reinstatement







Mechanics of Excavation & Repair

1. **Size:** Smaller is Better
2. **Shape:** Rectangular shape is Problematic – Corner Cracks
3. **Cut Method:** How You Cut is Important – Low Impact
4. **Repair Method:** Waterproof Joint, Restore Load Transfer Ability, Aesthetically Pleasing

1. Smaller is Better

- Smaller is better and less intrusive

Laparoscopic Surgery

- Smaller Incision
- Short Recovery Period
- Faster Healing
- Smaller Scar
- Lower Cost





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Keyhole Operation

- Smaller Opening (keyhole)
- Faster Restoration
- Less Damage to Road System
- Smaller Repair Footprint
- Lower Cost

★ and safer -- no men in the h

2. Circular Shape is Better

Shape Matters !

- Smaller Circular Shape – More Precise Excavation

- Waterproof: No saw over-cuts at the corners
- Environmentally friendly, reuses materials, creates no spoils and no VOCs
- Reduced surface scarring -- 10 to 20 times SMALLER than conventional restoration (1.75 ft² vs 24 ft² to 35ft²)
- Circular geometry with no corner cracks

- Proven Strength -- NO Failures

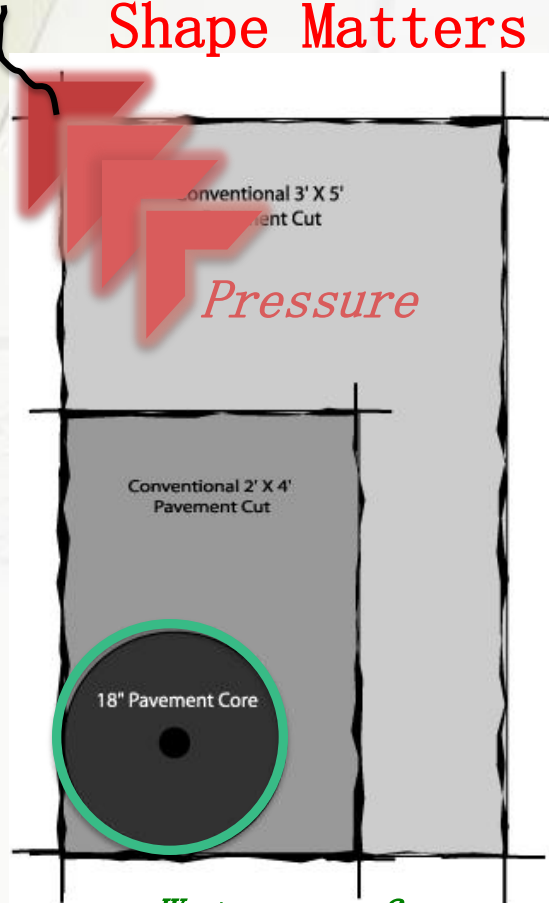
- Reinstated core will support 50,000 lbs wheel load

- Better Performance -- 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

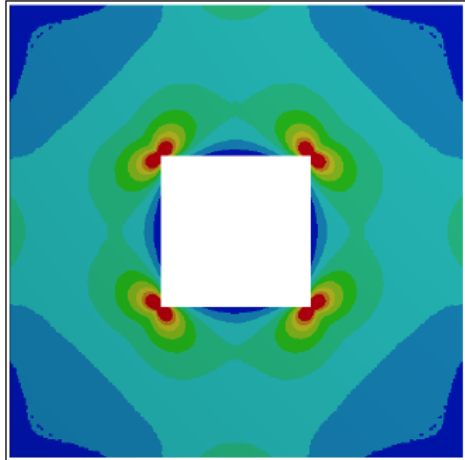
- Reduces Pavement Restoration Cost by 87%

- Safer for Workers and Public

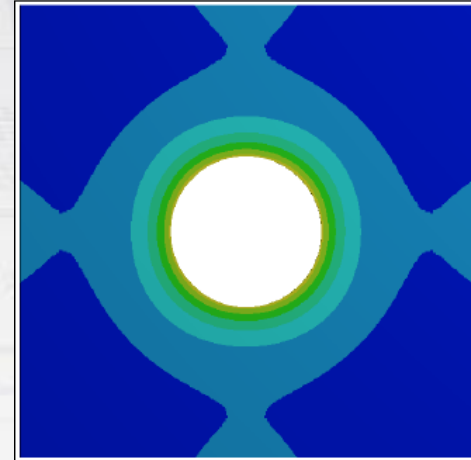


*Waterproof
No Corner Cracks*

Traffic Pressure = Corner Cracks

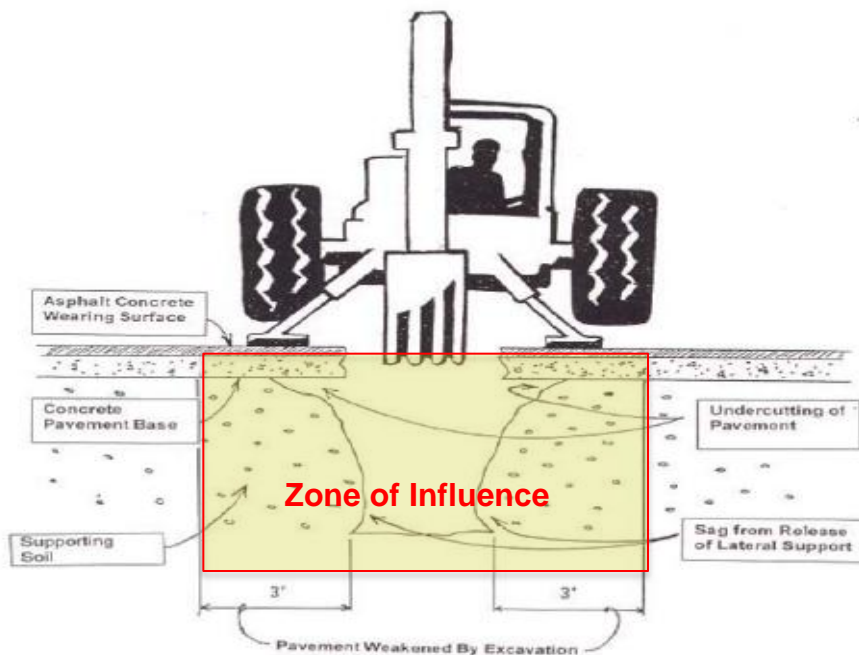


Rectangular format concentrates **FOUR TIMES MORE** Traffic Pressure in corners than Circular format, causing corner pressure cracks that allow water penetration.



3. How You Cut is Important.

- Conventional excavation (Jackhammer, Backhoe, Pavement Breaker) weakens pavement well beyond the cut causing subsidence in "Zone of Influence"
- Precise coring operation eliminates Zone of Influence and reduces pavement damage



The precise coring process and vacuum excavation **eliminates any "Zone of Influence"**.

4. Proven Repair Method

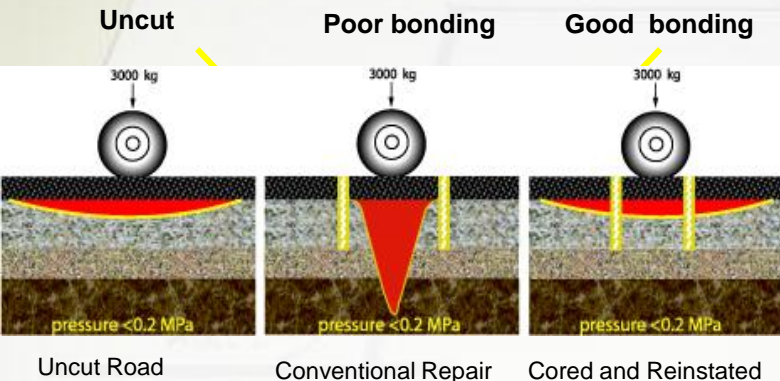
Golder Associates 10 year Engineering Study (1992–2002):

FINDINGS:

- Reinstated Core Reunites Pavement Sections with Mechanical Waterproof Joint
 - No sealants to squeeze out with action of traffic
 - No ground water penetration
- Restores Load Transfer Capability of Pavement System

“Based on trials and testing we are satisfied that Process will ensure satisfactory long term performance of the pavement reinstatement.”

Proven Repair Method



Uncut Road Conventional Repair Cored and Reinstated

Effective Load Transfer



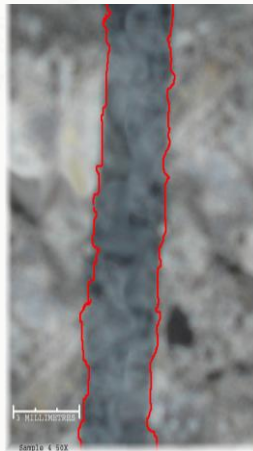
Sep. 1995



Dec. 2002



**Creates Mechanical Joint
No Voids**



**Fast Setting, Rapid Strength Gain
Convenient, Consistent, Replicable**



Long Term Performance through freeze-thaw cycles



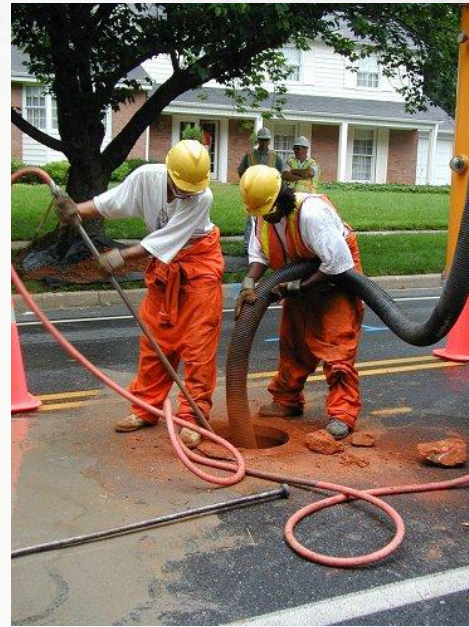
Comprehensive Laboratory Testing



Application of Keyhole Technology

What is Keyhole Technology ?

- Method of accessing or viewing underground utilities through small holes or "keyholes"
- Keyhole coring excavates the pavement and vacuum excavation exposes the utilities



Keyhole Applications

How Does it Work ?

- Expose underground facilities and perform necessary work using long-handled tools



Keyhole Applications

Potholing for HDD – Cored Openings

- One contractor performed over 2,500 damage prevention cored openings in 2006
- About 80% are for inspection purposes only



Keyhole Applications

Cast Iron Joint Sealing -- Encapsulation



Keyhole Applications

Cathodic Protection – Anode Insertion



Keyhole Applications

Service Cut-off -- Abandonment



Keyhole Applications

PE Service Installation – Lateral Reconnection



Fuse 2"X1/2" plastic tee



Connect 1/2" tube to service tee



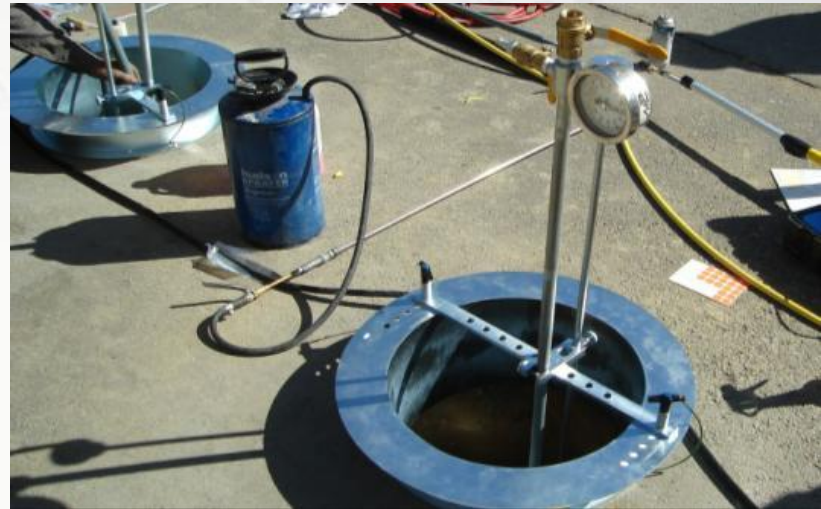
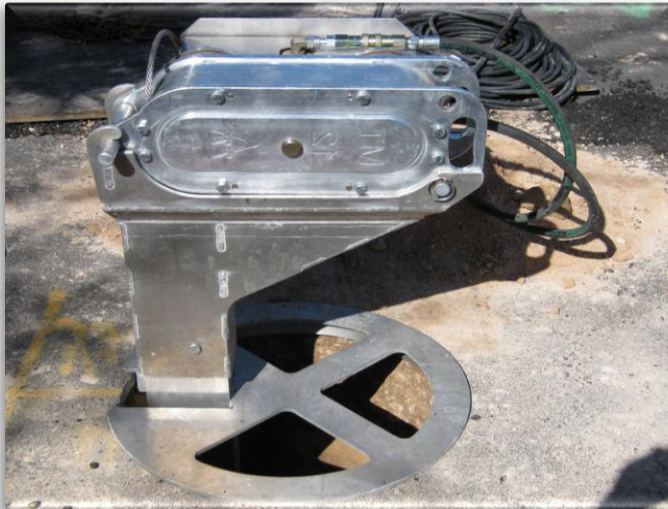
Soap test new service connections



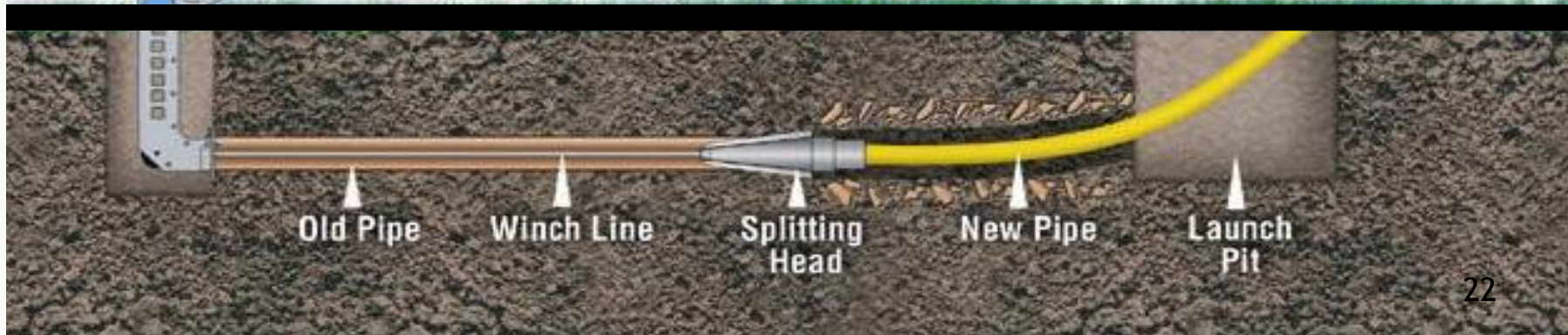
Completed service transfer

Keyhole Applications

Main Replacement – Pipe Splitting



Mini-GRUNDOTUGGER®



Keyhole Applications

Valve Maintenance and Replacement



Keyhole Applications

Camera Inspection on Live Mains



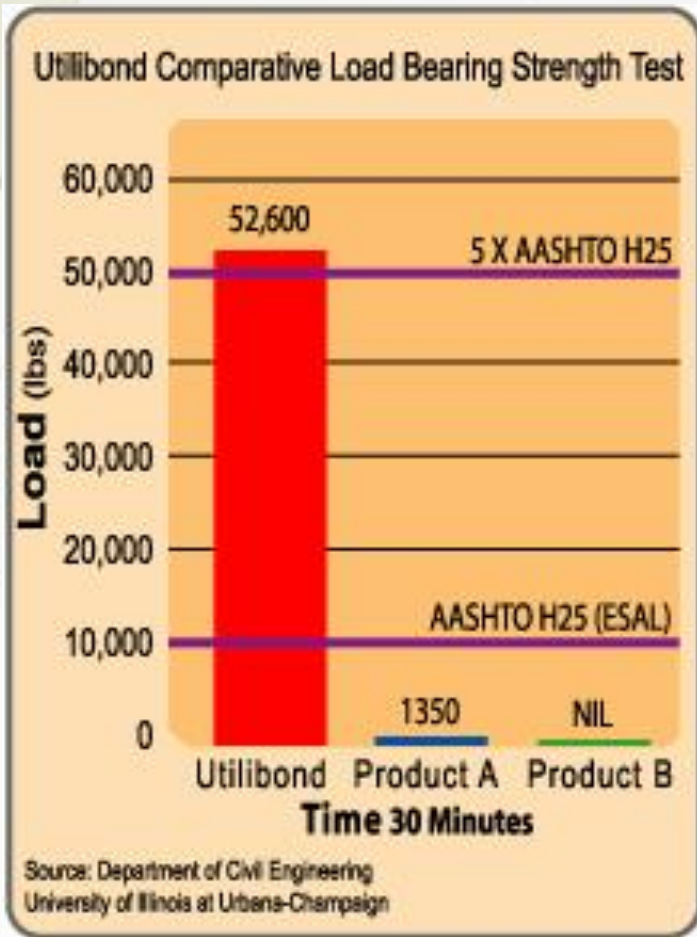
Keyhole Applications

Final Repair



Almost Invisible

Bond Strength and Public Convenience



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

** Construction Technology Laboratories
An AASHTO Accredited Laboratory*



University of Illinois
Urbana-Champaign

Reduced Delay Greater Public Convenience

GTI No Backfill Bottomless Test



Core 8"



Vacuum down 6"



Suspend false bottom



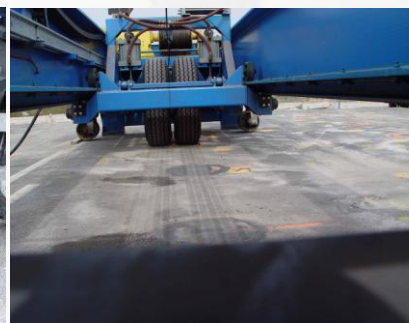
Pour in Pea stone



Pour in Utilibond



Replace core



Loading machine



Wheel Track

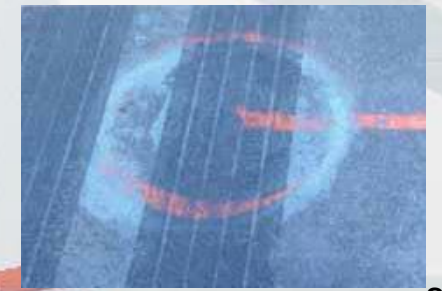


10,000 lb Load




Repeat

**43,378
Passes
Later ...**



Still Intact



Restoration of Utility Cut Study


Toronto Field Experiment 2001-03

CONVENTIONAL TRENCH

- Noticeable failures in conventional cut.
- Joint between road and cut opened.
- Settlement in trench along wheel path
- Joint seal was lost because of traffic.

- Higher levels of moisture (compared with keyhole)

ROTARY CUT KEYHOLE

- No defects.
 - Performed well throughout life of project.
 - Core remained level with the road.
 - The bonding material remained intact
 - Waterproof bond.
- 

REPORT: "Keyhole construction is an effective restoration technique that should be encouraged whenever feasible."





US Army Corps
of Engineers



National Research
Council Canada 28



Better Method – Extends Pavement Life

- Precise Coring – No Heavy Equipment
 - No Zone of Influence
 - No Pressure Corner Cracks or Saw Over-Cuts
 - No ground water penetration
 - Restores Load Transfer Capability of Pavement System
 - Reunites Pavement Sections with Mechanical Waterproof Joint
 - No sealants that can squeeze out with action of traffic needed
 - No ground water penetration
 - Environmentally Friendly – Consumes Fewer Resources
 - Reuses original pavement core – no spoil to truck away – no new paving materials required.
 - No VOCs to escape -- 1/12 Carbon Footprint of conventional methods
 - Reduced Public Inconvenience – Aesthetically Pleasing – Cost Effective
 - Shorter and fewer road closings -- Reduced traffic delays
 - Reduced visual scarring – Exact pavement match
 - Saves money for Taxpayer/Ratepayer.
- 
- 

Advantages for the Municipality & Public

- **Improved Appearance.** Almost invisible, matching circular core -- less than 1/10 the size of conventional road cut).
- **Reduced Damage to the Pavement.** 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:** Restoration is

Reduced Carbon Footprint

Excavation

1

Coring



Core



Vacuum

Same Day



Reinstate



Finished Repair

Restoration

1

Conventional



Saw Cut



Excavate Pavement



Dump Spoil



Vacuum



Temporary Asphalt



Compact Patch

Months Later

2



Concrete Base



Excavate



Asphalt Surface



Dump Spoil



Compact Surface

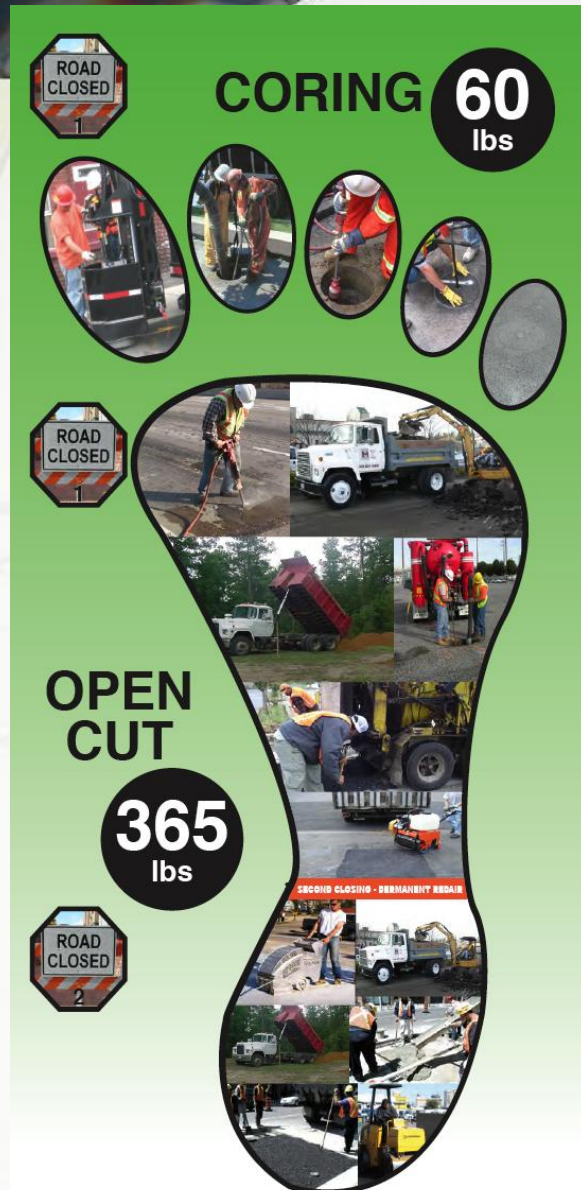
Reduced Carbon Footprint

- Coring and Reinstatement has an Operating Carbon Footprint **ONE-SIXTH** the size of Conventional excavation and restoration methods (60 lbs vs 365 lbs)

BUT if you add the CO₂ emitted in the production of the cement products used in the Repairs



- Total Carbon Footprint of the Conventional method is **12 TIMES** the size of Keyhole Coring & Repair (845 lbs vs 69 lbs)



3.6 million Utility Cut Permits (issued by municipalities every year)





Environmental Impact of Coring

- 20–25% of utility cuts can be small holes (Gas Technology Institute)
- If 800,000 small hole utility cuts in NA were performed with keyhole coring and reinstatement:

Reduction in asphalt used: 2 million tons

enough to resurface 650 miles of 4 lane highway

Reduction in spoil disposal: 27 million cu. ft.

— enough to fill 200,000 dump trucks

Reduction in work zone delay: 2.8 million hours

1.9 million gal fuel

\$520 million cost

Restoration Cost Savings to Utilities: \$340 to \$900 million

Reduction in GHG emissions, 320,000 Tons of GHG Emissions

≈ equal to CO₂ emissions from Average US Power Plant
(2.8 billion tons CO₂ ÷ 8000 power plants)

Questions and Answers



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