Keyhole Construction and Pavement Restoration Techniques
Keyhole Applications Initiative

Presentation and Demonstration

• Project overview
• Keyhole history
• Similarities to arthroscopic surgery
• Primary equipment
• Keyhole sequence
• Quality Control
• Benefits of Process
• Demonstration
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History

• Small (Keyhole) Excavations initiated in 1960’s
• Used primarily for leak repair
• 1990’s rekindling of interest (“potholing” for locates)
• Enbridge - Consumers Gas developed “rotary cutter”
• Other core boring grouts/bonding agents developed
• Wide range of tools developed
• Currently - wide range of activities and tools in use today
• Adoption of keyhole process by industry leaders
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Keyhole Techniques akin to Arthroscopic Surgery

Arthroscopic Surgery

- Smaller Incision (Portal)
- Short Recovery Period
- Small Scar
- Lower long-term Cost

Keyhole Operation

- Smaller Opening (Keyhole)
- Quicker Restoration
- Small Repair Patch
- Lower long-term Cost
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Primary Keyhole Coring Equipment
Spotting the core location
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Coring Operation
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Clean Cut
Remove the core
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Various types and depths of roadway materials
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Vacuum Excavation
Pipe Work
Backfill and Tamp
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Grout/bonding agent
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Core replacement
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Quality Product
Reduced profile
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Traditional Restoration

Keyhole Restoration
QA-QC Protocols

Tracking core stability

- Track relative stability/movement between core and surrounding pavement
- Documentation of existing pavement condition
- Documentation of any changes in pavement condition
- Tracking core/replacement performance over time relative to surrounding pavement
QA-QC Protocols

Core Tracking Records

- Assigned ID number to each core
- Address & As-Built sketch
- Location to center of core (potentially using GPS)
- Record of backfill type, core grout/bonding agent type
- Photographic record of finished core replacement
- Record of crew performing the work
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QA-QC Protocols

- Tool Weight: 4.5 LBS
- Tool Weight with Case: 11.5 LBS
- 6" Rule Depth Gage (in 32nds & 64ths)
  With locking Knurled Nut
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Benefits

• Fast! (Typically < 4 hours total)
• Less inconvenience to vehicular traffic
• No over night plating
• Reduced exposure time of workers and traveling public
• Road cut is MUCH smaller in size
• Controlled and consistent size of opening
• Exceeds AASHTO weight bearing standards
• No collateral damage to roadway (No Jack Hammer)
• Circular hole prevents stress cracks (No square corners)
• Less intrusive
• Existing material replaced (Same look and feel)
Jurisdictional Approvals

Numerous jurisdictions have approved the use of coring and replacement of the core as a permanent paving technique, including:

- City of Detroit
- City of Toronto
- Penn DOT
- Virginia DOT
- Maryland DOT
- City of Portland
- Montgomery Co.
- Prince Georges Co.
- And many more...
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For more information contact:

Dennis Jarnecke  
Gas Technology Institute  
1700 S. Mount Prospect Rd.  
Des Plaines, IL  60018

847-768-0943  
dennis.jarnecke@gastechnology.org