Spray Injection Patching

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Do I have a problem?

➢ It is estimated that there are OVER 50,000,000 potholes on the nation’s roadways at any given time.
What methods do you use?

- Edge Seal
- Semi-permanent
- Throw & Roll
- Throw & Go

Is there a more effective and efficient option?

Yes!
What is that option?

Spray Injection Repair

History of Spray Injection

- Introduced in the 1980’s as an alternative to conventional methods
- Early machines not very efficient or operator-friendly
- Substantial changes over the years improved the efficiency
- Now extremely operator-friendly
Strategic Highway Research Program (SHRP)

- 1,250 pothole patches were placed at eight test sites across the United States and Canada.
- Primary objective was to determine most effective and efficient way to repair potholes in the roadway.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Average Productivity (tons/hr)</th>
<th>Laborers Recommended</th>
<th>Average Productivity (tons/person-day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throw-and-roll</td>
<td>1.6</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Edge seal</td>
<td>1.4</td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>Semi-permanent</td>
<td>0.3</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>Spray injection</td>
<td>1.7</td>
<td>2</td>
<td>3.4</td>
</tr>
</tbody>
</table>

* No method out produces the spray injection method.
SHRP RESULTS - Procedures

- The spray injection placement procedure resulted in a lower percentage of patch failures than other placement procedures.

SHRP RESULTS - Materials

- Spray injection patching materials resulted in a lower percentage of patch failures than other patching materials.
What is Spray Injection Patching?

A complete cold in place delivery system

- The Spray Injection patching unit
- Clean crushed aggregate
- Quality water-based asphalt emulsion
  - Example – CRS-2, CRS-2P, AE90, HFE150

Spray Injection patching: Clean

- The equipment utilizes Hi volume low pressure air to blow debris, lose aggregate and moisture from the area to be filled.
Tack the bottom

- When tacking always spray at least 6 inches past the edge of the patch to seal moisture away from that area.

Fill

- Mixture of rock and emulsion is injected into the repair area.
Dry Coat

- Light coating of dry stone as a blotter to keep vehicles from tracking when crossing new patch.

Emulsions

What are Emulsions
Asphalt Milled together with Water and soap or emulsifiers.

What are the advantages of using emulsions over MC’s or straight Asphalt
1. Safe delivery system less than 200 F.
2. Flexibility to deliver various cure times.
3. Availability and cost
Emulsions
Types

Emulsion come in two different charges
+ Positive charge are referred to as Cationic designations
  they always start with C such as CRS-1, CRS-2 CMS-1, CMS-2
  CSS-1 DO NOT USE for this process

- Negative charged are referred to as Anionic or high float
  HFE-90, HFE-150, AE-90 traditionally are slower to set and work well with dirt rock
  Charges are defined by ph balance provided by the surfactant used
  other letter designations  R rapid, M medium & S set
  Cationic Rapid Set-type 2= CRS-2

Numeric designation  1 or 2 refers to Viscosity 1= 100 to 200 vis.
  2 = 200 to 400 vis. Anionic 90 vis. 150 vis are ranges as well

How to select the proper emulsion

1. Use a common oil that you work with, for your Chip seal program. CRS-2, HFE-150
2. Advised by your Local Asphalt Emulsion supplier. WE don’t require Polymer types
   CRS-2P, R, LM
3. Time of the year when surface temperature is
   More than 50 f. use R rapid set CRS-2 or HFE150
   Less than 50 f. use M medium set  CMS-1 or 2
Aggregates

Commonly used in this process
1. Standard state spec. rock for chip sealing
   common sizes ¼ 10, 3/8”, ½”, 5/8”
   The smaller size is preferred unless you are building shoulders. This is for ride ability and making tight mix.

Key in selecting aggregate
   clean, multiple fracture, cubical, less than
   5% 200 screen if possible. Unless you are using High Float, however YOU will always use more oil when fines are present!!

Methods – Trailer Patcher
Methods – 2-Man Truck Mount

Methods – 1-Man Cab Operated
Is spray injection for potholes only?

No!

Why not?

- Repairs potholes
- Alligator areas
  - Make sure your base is dry for the best results
- Shoulder repairs
- Wheel rutting
- Radius repairs
- Utility cuts
Will spray injection save me $$?

Yes!
At a glance – Ohio Example

Cold Mix Annual Savings $12,451.73

How will it save me $$?

- Materials used in spray injection cost approximately half of what cold mix costs
- Labor savings – less people on patching crew with more productivity
- Don’t repair the same areas twice which you often have to do with standard mixes.
### At a glance – Ohio Example

**Cold Mix Annual Savings**  $12,451.73

**Cut & Redo Annual Savings**  $8,880.20

### COST COMPARISON

**DURAPATCHER VS COLD PATCH**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Cost</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COLD PATCHING COST</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hours</td>
<td>$45.00 per Hour</td>
</tr>
<tr>
<td>2</td>
<td>Men</td>
<td>$10.00 per Hour</td>
</tr>
<tr>
<td>1</td>
<td>Tons Cold Mix</td>
<td>$1,199.00 per ton</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COST PER TON**  \( \frac{\$4,221.00}{4} = \$1,055.25 \)

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</tr>
<tr>
<td>3</td>
<td>Hours</td>
<td>$45.00</td>
</tr>
<tr>
<td>1</td>
<td>Dump Truck</td>
<td>$1,700.00</td>
</tr>
<tr>
<td>1</td>
<td>Drip Spill</td>
<td>$2,500.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COST PER TON**  \( \frac{\$4,935.00}{7.5} = \$658.00 \)

**Average Savings per TON**  $114.72

**Repeated Cold Mix Repairs**  2 Times / TON  $439.00

**Wasted Cold Mix**  5%  $559.00

**AVG ANNUAL SAVINGS**  **$12,451.73**

*Based on $00 TONS ANNUALLY*
At a glance – Ohio Example

Cold Mix Annual Savings  $12,451.73
Cut & Redo Annual Savings  $8,880.20

AVG TOTAL ANNUAL SAVINGS  $21331.93
Emulsion Storage

- Increased productivity by having materials on hand
- Reduced costs of emulsion by bulk purchase
- Emulsion available for other uses
Questions?

Thank You