How To Develop and Implement a Successful In-House Chip Seal Program

Bill Tompkins
Maintenance Field Engineer
Pavement Preservation is:

- “Applying the Right Treatment to the Right Road at the Right Time”
- Pavement Preservation Treatments, by definition, do not add structural strength
- A long term strategy
  - Network condition will improve over time
  - Cost to maintain network will go down over time
1. Strategic, long term program of identifying, programming, budgeting, and completing pavement preservation projects.

2. Improve the statewide condition of INDOT’s pavement network at the lowest possible cost.

3. Part of INDOT’s overall Pavement Preservation Program, which includes elements of the Maintenance Work Program and District Pavement Program.
Available Treatments

HMA Treatments:
1. Asphalt Crack Seal (Activity 207, crack filling)
2. Rout and Seal (Activity 209, crack sealing)
3. Seal Coat
4. Microsurface
5. QC/QA HMA Surface 4.75mm (0.75 in. thickness)
6. UBWC
Available Treatments

PCCP Treatments:

1. PCCP Patching
2. PCCP Joint Sealing
3. PCCP Profiling/Retexturing
4. PCCP Dowel Bar Retrofit

ADA requirements must be met as necessary.

Candidate Generation

Asphalt Surface Criteria:
- List 1: Age between 8 and 12 years and IRI < 130
- List 2: Rut > 3/8"
- List 3: Friction Number < 25

Additional screening criteria for Seal Coat:
- Rutting < ¼ Inch
- ADT < 5,000 (ADT level can be customized per District)

PCCP Surface Criteria:
- List 1: Age = between 8 and 12 years
- List 2: IRI > 130
- List 3: Friction Number < 25
1. Cracking – note severity and extent of

<table>
<thead>
<tr>
<th>Severity</th>
<th>Extent</th>
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</thead>
<tbody>
<tr>
<td>Transverse Cracking</td>
<td>Low ☐  Moderate ☐  High ☐</td>
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<tr>
<td>Longitudinal Cracks</td>
<td>Low ☐  Moderate ☐  High ☐</td>
</tr>
</tbody>
</table>

Alligator Cracking

Other types of Cracking

2. Crack seal prior to treatment to be done?  Completed  Needs Crack Treatment
   a. Maintenance – plan well ahead of contract, minimize overband
   b. Include in Contract (if not in-house Chip Seal)

3. Patching – minimal, localized patching may be done. Estimate % patching. ________________

4. Pavement Markings (note types of lane lines and other special markings):
   a. Micro – ALL pavement markings should be removed with appropriate removal items.
   b. UBWC – THERMOPLASTIC markings should be removed with appropriate removal items.

5. Other items of note (stripping concerns, RPM’s, Underbody plow route, etc).

6. Final Treatment Selection:
   - Microsurfacing
   - UBWC
   - 4.25mm Thin HMA
   - Chip Seal

<table>
<thead>
<tr>
<th>Chip Seal Oil</th>
<th>#11</th>
<th>#12</th>
<th>Other</th>
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Comments: ____________________________

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<thead>
<tr>
<th>Concurrency of Candidate</th>
<th>Yes/No</th>
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<tbody>
<tr>
<td>Pavement Engineering:</td>
<td>Yes/No</td>
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</table>

<table>
<thead>
<tr>
<th>Highway Operations:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>District:</td>
<td>Yes/No</td>
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</table>
## FY 12 Chip Seal Program

<table>
<thead>
<tr>
<th>District</th>
<th>Lane Miles</th>
<th>Total Cost (excluding Shoulders)</th>
</tr>
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<tbody>
<tr>
<td>Crawfordsville</td>
<td>217.9</td>
<td>$2,084,581.47</td>
</tr>
<tr>
<td>Fort Wayne</td>
<td>233.4</td>
<td>$1,500,952.96</td>
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<tr>
<td>Greenfield</td>
<td>209.3</td>
<td>$1,403,973.60</td>
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<tr>
<td>LaPorte</td>
<td>242.5</td>
<td>$2,514,641.23</td>
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<tr>
<td>Seymour</td>
<td>269.7</td>
<td>$2,432,253.88</td>
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<tr>
<td>Vincennes</td>
<td>251.5</td>
<td>$2,186,746.13</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>1424.3</strong></td>
<td><strong>$12,123,149</strong></td>
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</table>
# Chip Seal Accomplishments

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Lane Miles</th>
<th>Total Cost</th>
<th>Cost Per Lane Mile</th>
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<tbody>
<tr>
<td>2009</td>
<td>444</td>
<td>$3,645,879.52</td>
<td>$8,207.37</td>
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<tr>
<td>2010</td>
<td>705</td>
<td>$5,457,894.29</td>
<td>$7,744.77</td>
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<tr>
<td>2011</td>
<td>1161</td>
<td>$10,093,260.32</td>
<td>$8,696.14</td>
</tr>
<tr>
<td>2012</td>
<td>1424.3</td>
<td>$12,123,149.27</td>
<td>$8,511.65</td>
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<tr>
<td>2013 In progress</td>
<td>1485.3</td>
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<td></td>
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</tbody>
</table>

*Total costs: Labor, Material & Equipment

*Includes Fog Seal costs
Seal Coat

Definition:
• A seal coat consists of an application of asphalt material to the pavement surface, followed immediately by a layer of coarse aggregate.
• A seal coat does not add structure to a road.
• If you had a bad road before, you’ll still have a bad road.
• INDOT Specification 404

Chip Seal and Seal Coat are the same thing!
Seal Coat

- Benefits of a Seal Coat:
  - Prevents deterioration of a pavement surface
  - Arrests minor raveling
  - Seals minor cracks
  - Waterproof pavement surface
  - Provides new wearing surface
  - Improves friction numbers
INDOT has developed a seal coat design program

Simple material inputs generate theoretical application rates

Use as a starting point, field adjustments as required
Seal Coat Design

- Designs include:
  - Specific material properties
    - All #12’s (#11’s) are NOT equal
  - Specific road conditions
    - How much emulsion will the road “drink”?
    - How “dry” is the pavement?
Chip Seal Design

- Designs show us
  - Typically, use less stone
Seal Coat (SC) Aggregate

- INDOT Maintenance is utilizing new seal coat aggregate specs
- Spec requires less dust, and two new sizes
- Includes 2 face crushed gravel, dolomite, and limestone

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>SC 11</th>
<th>SC 12</th>
<th>SC 13</th>
<th>SC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 in. (12.5mm)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3/8 in. (9.5mm)</td>
<td>75 - 95</td>
<td>95 - 100</td>
<td>100</td>
<td>94 - 100</td>
</tr>
<tr>
<td>No. 4 (4.75mm)</td>
<td>10 - 30</td>
<td>50 - 80</td>
<td>80 - 90</td>
<td>15 - 45</td>
</tr>
<tr>
<td>No. 8 (2.36mm)</td>
<td>0 - 10</td>
<td>0 - 35</td>
<td>8 - 12</td>
<td></td>
</tr>
<tr>
<td>No. 16 (1.18mm)</td>
<td></td>
<td></td>
<td>0 - 2</td>
<td>0 - 4</td>
</tr>
<tr>
<td>No. 30 (600um)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decant</td>
<td>0 - 1.5</td>
<td>0 - 1.5</td>
<td>0 – 1.5</td>
<td>0 – 1.5</td>
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Seal Coat Aggregate

- Crushed Limestone, #11 or #12
  - #11 = ½” Top size, Application Rate = 16 To 20 Lb/SYD
  - #12 = 3/8” Top size, Application Rate = 14 To 17 Lb/SYD

- Crushed Gravel (2 face)
  - SC 16 = ½” Top size, Application Rate = 20 Lb/SYD
  - #11

- Damp OK?

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<thead>
<tr>
<th>TYPE (see Note 1)</th>
<th>APPLICATION</th>
<th>COVER AGGREGATE SIZE NO. AND COURSE</th>
<th>RATES OF APPLICATION PER SQUARE YARD (SQUARE METER)</th>
<th>ASPHALT MATERIAL GALLON (LITER) AT 60°F (16°C)</th>
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<tbody>
<tr>
<td>1 or 1P (see Note 2)</td>
<td>Single</td>
<td>23, 24</td>
<td>12-15 (5.4-6.8)</td>
<td>0.12-0.16 (0.45-0.61)</td>
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<tr>
<td>2 or 2P</td>
<td>Single</td>
<td>12</td>
<td>14-17 (6.4-7.7)</td>
<td>0.29-0.33 (1.09-1.25)</td>
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<tr>
<td>3 or 3P</td>
<td>Single</td>
<td>11</td>
<td>16-20 (7.3-9.1)</td>
<td>0.36-0.40 (1.36-1.51)</td>
</tr>
<tr>
<td>#11</td>
<td>Single</td>
<td>6</td>
<td>19-22 (8.7-9.9)</td>
<td>0.58-0.63 (2.12-2.35)</td>
</tr>
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</table>
Emulsion

- **AE 90**
  - Non-polymer, medium setting
- **HFRS 2**
  - “High Float”, rapid setting, non-polymer
- **AE 90 S**
  - Polymerized, rapid setting
  - Faster set, return to traffic
  - Better stone retention
  - Better long term performance
  - Required for Mainline (Type P)
# Emulsion

## Application Rates

- **SC 11** = 0.36 To 0.40 Gal/SYD
- **SC 12** = 0.29 To 0.33 Gal/SYD
- **SC 16** = 0.36 To 0.40 Gal/SYD

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<td>4 or 4P</td>
<td>Single</td>
<td>9</td>
<td>20-22 (9.3-10.0)</td>
<td>0.62-0.68 (2.36-2.60)</td>
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Fog Seal

What is a fog seal?

IDM definition:

_Fog seals are a method of adding asphalt to an existing pavement surface to improve sealing or waterproofing, prevent further stone loss by holding aggregate in place, or simply improve the surface appearance._
Fog Seal

- A fog seal IS
  - A light, uniform application of a diluted asphalt emulsion to the pavement surface.
  - INDOT RSP 412-R-549

- What does a fog seal do for a Seal Coat?
  - “Locks in” loose chips from the top
  - Makes the road “black”
    - Improves heat retention, curing of seal coat
    - Improves surface appearance
      - Pavement markings stand out better
      - Looks like a resurface
Fog Seal Examples
Fog Seal

- Material: AE F
  - Diluted: 30% vs. 65%+ for AE 90 S
    - Penetrates into cracks/voids
  - “Hard Penetration”
    - Not sticky
- Application Rate
  - 0.10 to 0.12 gal/SYD
  - Actual rate should be shown on plans
- Cure time
  - Ideally, less than 30 minutes
- A properly constructed fog seal uses no aggregate
Fog Seal – Finished Product
Questions???

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How To Develop and Implement a Successful In-House Chip Seal Program

Gary Vandegriff
Seymour Highway Maintenance Director, INDOT

March 6, 2013
Considerations

- Pre-season equipment prep
  - Operational
  - Callibrated

- Pre-season material planning
  - Orders in
  - Where will stockpiles be?

- Pre-job communications
  - Pre job signage and message boards
  - Press releases with schedules
  - And Purpose!
Considerations

- Job Considerations
  - Traffic control – can get a little complex
  - How to handle unique situations
    - Hills
    - Curves
    - Intersections
    - Towns
  - Need to calculate right number of haul trucks
- Plan B’s – for when things don’t go as you thought…
- Weather
- Equipment breakdowns
Considerations

- Plan B’s – for when things don’t go as you thought...
  - Weather
  - Equipment breakdowns
  - Material problems
  - Traffic