Preservation Inspection
Why It Is Important

W. Pierre Peltier
GM Sales & Business Development
Strawser Construction Inc.
Terry Asphalt Materials Inc.
HouseGuard
Preservation

...Preservation involves a paradigm shift from “worst first” to more proactive “optimum timing”...
“...is a program employing a network level, long term strategy that enhances pavement performance by using an integrated, cost effective set of practices that extend pavement life, improve safety and meet motorist expectations.”

FHWA Pavement Preservation Expert Task Force
Addresses good pavement ahead of distresses, (typically 4–7 yrs. old)

Applied @ the right time pavement is restored to almost new condition

Cumulative effect of treatments postpone rehab and reconstruction

Less expensive in the long run

Less disruptive to traffic
“...consists of non-structural enhancements made to the existing pavement sections to eliminate age-related, top-down surface cracking that develops in flexible pavements due to environmental exposure. Because of the non-structural nature of minor rehabilitation techniques, these techniques are placed in the category of pavement preservation.”

AASHTO Hwy Subcommittee on Maintenance
“...a planned strategy of cost effective treatments to an existing roadway system and it’s appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system without significantly increasing the structural capacity.”

AASHTO Standing Committee on Highways
“...something that you put on a road a year before you need it...”

Mid 1970’s
Maintenance Engineer VDOT
The graph illustrates the concept of maintaining pavement conditions to maximize its life and cost-efficiency. The Y-axis represents the pavement condition ranging from Excellent to Failed, and the X-axis denotes the age of the pavement ranging from 1 to 25 years.

- **Excellent** condition experiences a 40% drop in quality at 75% of its life.
- **Good** condition has a similar 40% drop in quality at the 75% mark.
- **Fair** condition exhibits a drop in quality after 40% of its life, marked by $2.00 for PP (Pavement Preservation) Here.
- **Poor** condition indicates a 40% drop in quality at 12% of its life, with $4.00 for RM (Reactive Maintenance) Here.
- **Very Poor** condition shows a 40% drop in quality at a certain point, followed by a note that reactive maintenance results will vary based on PCI.
- **Failed** condition, indicating the pavement is beyond repair after a 40% drop in quality.

The graph emphasizes the importance of proactive maintenance to avoid costly reactive maintenance. The legend states PP = Pavement Preservation and RM = Reactive Maintenance.
Pavement Preservation is not new...

…it’s just doing the right thing, at the right time, to the right pavement.
What We Will Cover

• Crack Treatments
• Fog Seals
• Chip Seals
• Slurry Seal
• Micro Surfacing
Why Crack Treatment?

• Prevents water intrusion into subbase
• Prevents incompressible intrusion
• Improves ride quality smoothness
• Slows down pavement deterioration
“When budgets are tight, the time to seal is right!”
(up to 9 years performance—when done correctly)
"Cracks are inevitable….with proper and timely application, crack sealing and filling can extend pavement life........." (FHWA-RD-99-147)
Why Crack Treatment?
To prevent this...
What cracks to treat?

• All cracks soon after they appear... any crack opening will allow moisture penetration into pavement foundation (subbase)

• “New” industry standard all cracks ≥1/8”
Water intrusion
Incompressible intrusion
What cracks to treat?
“Don’t forget edge joints”
When to treat cracks?

• Variety of materials exist for year around sealing- geographical formulations

  Best Time

• Ambient conditions 40°F (5°C) – 60°F (16°C) - cracks mostly or completely open, more material can be applied in crack reservoir.
“Working” vs. “Non-working” cracks

- “Working” (high movement) - $\geq 3\text{mm movement}$ (CALTRANS states $\geq 6\text{mm}$) – newer pavements
  - Thermal
- “Non-working” (low or no movement) - $< 3\text{mm movement}$ – older pavements
  - Longitudinal
  - Block
- Fatigue
Two different treatments

1) “Working” cracks- crack sealing [10% of cracks]
2) “Non-working” cracks- crack filling [90% of cracks]
Crack Filling
Large Cracks???
Large Cracks - > 1.5” wide

Polymer modified binder/aggregate mixtures available:
There is no one sealant or installation method for all applications.
Costly mistake...

Improper sealant selection for climatic conditions

Sealant too stiff- premature material cohesive or adhesive failure
Cohesive failure:
Adhesive failure:
Cleaning Methods

• Compressed air - sufficient pressure and velocity
• Vacuum - in combination with compressed air
• Heat lance - used to warm pavement when needed
• Routing - cuts new bonding surface
Clean cracks:
Cleaning Methods
Overband Crack Seal

When:
2-4 years after new pavement is installed

Result:
Additional 5 years Pavement Service Life
Overband Crack Seal

Temperature - 45 degrees and rising

Width of Crack - 1/4” – 1”

Product Thickness - 1/16” – 1/8”

Bandwidth - 5” disc installs 4” wide product

Pay Item – Pound or Square Yard
Proper Equipment (basics)

- Oil-jacketed
- Thermostatic heat controls
- Continuous agitation
- Over-heating safety controls
- Right size for operation
- Many commercially versions available
Recommend Overband Appearance
Overband Crack Seal
Overband Crack Seal - Blocked
Overband Crack Seal - Bad
1. **Inexpensive Asphalt Emulsion**

2. **Diluted 50% with Water**

3. **Shot at .1 to .12 gallons / sy**

4. **“Locks Down” Chip Seals**

5. **Not Intended for Asphalt Surfaces**

6. **Pay Item - Square Yard**
Fog Seal

3 Main Concerns

Dry Time – Multiple Hours

Loss of Friction - Slick

Service Life – +/- 1 year
Fog Seal
Fog Seal

Caesar Creek State Park, OH
Frictional Mastic Surface Treatment
Frictional Mastic Fog Seal

Addressing 3 Main Concerns

Dry Time – 30 to 60 Minutes

Loss of Friction – Aggregate Inclusion

Service Life – 3 to 4 Years
Excellent Price Point
Fills Pavement Cycle Need

- Fog Seal: $0.40 - $0.75
- Chip Seal: $1.50 - $2.25
- Micro: $2.50 - $3.25
- Ultra Thin: $4.00 - $4.75
- Stand: HMA: $5.25 - $7.00
- FMFS: $1.00 - $1.50

*Prices based on Square Yard
State, County and Township Roads – “Before”
State, County and Township Roads – “After”
Local Residential – “During”
Local Residential – “After”
National, State and Local Parks – “Before”
National, State and Local Parks – “After”
Chip Seals

...are not intended as permanent pavement surfaces and are expected to last approximately five years.
“Good judgment comes from experience; experience comes from bad judgment”.

-Wise Old Indian Proverb

“Where the rubber meets the road”
Keys to Successful Seal Coats

• Goals of your new seal coat...
  – Life expectancy
  – Improved safety thru better skid values, fresh striping, natural roadway delineation
  – Know what a seal coat will and will not fix!
  – Understand public perception, i.e. noise, appearance, etc.
Chip Seals

...are applied to existing pavements to extend the life of the pavements and improve traction or “skid resistance”.
Chip Seals

service life varies depending on the condition of the existing surface, traffic volumes, weather, choice of materials and... how well it is placed!
Chip Seals serve to correct deficiencies such as:

- Lack of skid resistance
- Cracks (less than 1/4”)
- Raveling (or shelling)
- Bleeding
- Aged or oxidized pavement
- Provides a uniform-appearing surface
Chip Seals do NOT:

• Strengthen the existing pavement
• Increase the load-bearing capacity
• Smooth out rough pavement
• Bridge major cracks (wider than 1/4 inch)
• Eliminate the need for maintenance or reconstruction
AGGREGATE PARTICLES BEFORE ROLLING

VOIDS

ASPHALT FILM
AGGREGATE PARTICLES AFTER ROLLING

VOIDS

ASPHALT FILM
You want to see some black... if you cannot, you more than likely have excess aggregate on the road.
Rock on rock contact can and will eventually dislodge or damage other rock particles. This can contribute to eventual asphalt flushing and/or bleeding and ultimately loss of skid resistance.
Note that the liquid level went up when more dice were added.
EFFECT OF AGGREGATE RATE ON BINDER RATES
Aggregate Application

This is Very Important!
When you reduce the aggregate spread rate in order to increase the % voids, it is very likely that you will need to **increase** your asphalt rate in order to achieve the **desired embedment %**. The opposite effect applies if you are increasing the aggregate spread rate.
Aggregate Embedment

Generally, on low volume roads, the aggregate particles should be approximately 40 to 50% embedded.

On high volume roads, the aggregate particles should be approximately 30 to 40% embedded.
Aggregate Shape

Pay particular attention to the average particle size and particle shape in order to consistently match asphalt rates with aggregate gradations. Proper embedment depends on good particle shape.
Contamination from poorly maintained stockpiles or poor loader operation
Transverse Paper Joint
Top 5 Reason Seal Coats Fail

• Road being treated is not ready
• No asphalt or aggregate rate adjustments in the field
• Poor timing of aggregate application
• Too much aggregate, not enough asphalt!
• Cool nights
5 Keys to Success

• Timely, quality prep work (90-180 days ahead)
• Inspect surface (day of application) to determine rates and make knowledgeable adjustments in the field.
• Utilize variable rate spray bars and modified emulsions/asphalts on higher volume roadways
• Timely application of asphalt and aggregate to optimize aggregate embedment
• Re-visit your jobs from previous years to learn what works and what did not.
Micro Surfacing
Recommended Performance Guideline
For
Emulsified Asphalt Slurry Seal

A105
(Revised 2010)

NOTICE
It is not intended or recommended that this guideline be used as a verbatim specification. It should be used as an outline, helping user agencies establish their particular project specification. Users should understand that almost all geographical areas vary as to the availability of materials. An effort should be made to determine what materials are reasonably available, keeping in mind system compatibility and specific job requirements. Contact ISSA for answers to questions and for a list of ISSA member contractors and companies.

International Slurry Surfacing Association
#3 Church Circle, PMB 250
Annapolis, MD 21401
(410) 267-0023
www.slurry.org

© 2010 by International Slurry Surfacing Association
No reproduction of any kind may be made without written permission of ISSA.

Recommended Performance Guideline
For
Micro Surfacing

A143
(Revised 2010)

NOTICE
It is not intended or recommended that this guideline be used as a verbatim specification. It should be used as an outline, helping user agencies establish their particular project specification. Users should understand that almost all geographical areas vary as to the availability of materials. An effort should be made to determine what materials are reasonably available, keeping in mind system compatibility and specific job requirements. Contact ISSA for answers to questions and for a list of ISSA member contractors and companies.

International Slurry Surfacing Association
#3 Church Circle, PMB 250
Annapolis, MD 21401
(410) 267-0023
www.slurry.org

© 2010 by International Slurry Surfacing Association
No reproduction of any kind may be made without written permission of ISSA.
## MICRO-SURFACING EMULSION TEST RESULTS

**Emulsion source is Terry Asphalt Materials Hamilton, Ohio plant approved #7199**

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULT</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINIMUM POLYMER CONTENT, PER EMULSION RESIDU</td>
<td>exceeds</td>
<td>3.0% min.</td>
</tr>
<tr>
<td>RESIDUAL ASPHALT PCT.</td>
<td>69.0</td>
<td>62% min.</td>
</tr>
<tr>
<td>STORAGE STABILITY, DAY, PCT.</td>
<td>0.03</td>
<td>1.0 max.</td>
</tr>
<tr>
<td>PARTICLE CHARGE TEST</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>VISCOSITY, SAYBOLT FUSYL, 77°F, SEC.</td>
<td>45.0</td>
<td>20-150</td>
</tr>
<tr>
<td>SIEVE TEST, PCT</td>
<td>0.112</td>
<td>0.1 max.</td>
</tr>
</tbody>
</table>

### TESTS ON RESIDUE FROM EVAPORATION

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULT</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSOLUTE VISCOSITY, 60°C, POISE</td>
<td>10200</td>
<td>8000 min.</td>
</tr>
<tr>
<td>SOFTENING POINT, °C</td>
<td>63.0</td>
<td>60°C min.</td>
</tr>
</tbody>
</table>

### TESTS ON RESIDUE FROM DISTILLATION

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULT</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENETRATION, 25°C, DMM</td>
<td>59</td>
<td>40-90</td>
</tr>
<tr>
<td>DUCTILITY, 26°C, foeman, cm</td>
<td>126</td>
<td>40-90</td>
</tr>
<tr>
<td>SOLUBILITY IN TRICHLOROETHYLENE, % min.</td>
<td>98.0</td>
<td>97.5</td>
</tr>
<tr>
<td>RECOVERY, 25°C, % min.</td>
<td>69</td>
<td>60%</td>
</tr>
<tr>
<td>ASH CONTENT, % max.</td>
<td>0.044</td>
<td>2.0</td>
</tr>
</tbody>
</table>

### AGGREGATE

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULT</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS-130 WET COHESION</td>
<td>198 g/cm</td>
<td>12 kg/cm min.</td>
</tr>
<tr>
<td>30 MINUTES</td>
<td>221 g/cm</td>
<td>20 kg/cm min.</td>
</tr>
<tr>
<td>TS-114 WET STRIPPING</td>
<td>99%</td>
<td>90% min.</td>
</tr>
<tr>
<td>TS-110 WET TRACK ABRASION LOSS (1 HOUR SOAK)</td>
<td>81.9 g/m²</td>
<td>538 g/m² max.</td>
</tr>
<tr>
<td>TS-144 SATURATED ABRASION COMPATIBILITY</td>
<td>0.90 g</td>
<td>3.6 g max.</td>
</tr>
<tr>
<td>TS-113 MIXTURE</td>
<td>180 sec</td>
<td>Control to 120 sec</td>
</tr>
<tr>
<td>25°C</td>
<td>45 sec</td>
<td>Control to 35 sec</td>
</tr>
<tr>
<td>40°C</td>
<td>25 sec</td>
<td>Control to 30 sec</td>
</tr>
</tbody>
</table>

## JOB MIX FORMULA

THE FOLLOWING INFORMATION IS BASED ON DRY WEIGHT OF AGGREGATE

<table>
<thead>
<tr>
<th>TYPE A</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>MESHBERGER INDOT Source #2363</td>
<td>100%</td>
</tr>
<tr>
<td>HOLCOM TYPE I: PORTLAND CEMENT (W-04615)</td>
<td>11.0 ± 0.0%</td>
</tr>
<tr>
<td>CSS-1H LATEX MODIFIED EMULSION source approval #7199</td>
<td>9.0 ± 0.7%</td>
</tr>
<tr>
<td>RESIDUAL ASPHALT</td>
<td>9.0 ± 3.0%</td>
</tr>
<tr>
<td>WATER (INCLUDES MOISTURE IN AGGREGATE)</td>
<td>8.0 ± 3.0%</td>
</tr>
<tr>
<td>FIELD ADDITIVE (Terry Asphalt Materials supplied, proprietary)</td>
<td>1 ± 1.0%</td>
</tr>
</tbody>
</table>

**Terry Materials Laboratory Report**

Daniel J. Zuech, Field and Laboratory QA/QC Technician
## Calibration Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lbs. of Emulsion per count of aggregate belt.</td>
<td>( \text{Em.P.C.} )</td>
</tr>
<tr>
<td>2</td>
<td>Lbs. of cement per count of cement counter.</td>
<td>( \text{Cm.P.C.} )</td>
</tr>
<tr>
<td>3</td>
<td>Calibration by percent - % residual asphalt.</td>
<td>( \text{Em.P.C.} \times \frac{\text{R.A.}}{\text{Em.}} - % \text{R.A. Req'd} \times \text{Agg.P.C.} )</td>
</tr>
<tr>
<td>4</td>
<td>Calibration by percent - % emulsion.</td>
<td>( \text{Em. P.C.} + % \text{Em. Req'd} \times \text{Agg.P.C.} )</td>
</tr>
<tr>
<td>5</td>
<td>Find the count per minute of aggregate (C.P.M. Agg.) from desired production. (Lbs. Agg. P.M.)</td>
<td>( \text{Lbs. Agg. P.M.} \times \text{Agg.P.C.} = \text{C.P.M. Agg.} )</td>
</tr>
<tr>
<td>6</td>
<td>Find the lbs. of cement per minute required (Cm.P.M.) from the mix design.</td>
<td>( \text{Agg.P.M.} \times % \text{Cm. Req'd} = \text{Cm.P.M.} )</td>
</tr>
<tr>
<td>7</td>
<td>Find the count per minute of cement required. (Cm.C.P.M.)</td>
<td>( \text{Cm.P.M.} \times \text{Cm.P.C.} = \text{Cm.C.P.M.} )</td>
</tr>
</tbody>
</table>

### Note:
- Always use % expressed in decimal equivalent.
- Examples: 12.0% use 0.12, 7.2% use 0.072
Debonding
Animal Carcass
Road Way Contaminant
Screening Oversize Material
Bad Squeegee Work
Dirty Strike Off Drags
Start - Stop Joint
Unacceptable Joint
And Wet Joint
Cutting Straight Edge
Making Good Joint
Feathering Center Joint
Unacceptable Longitudinal Edge Line
Bad Edge Line - City
Unacceptable Patch
Hand Work - Mopping
Successful Construction
Top 10 Reasons Why Preservation Treatments Fail

1. Wrong Road
2. Wrong Treatment
3. Wrong Time
4. Lack of Funds
5. Lack of Knowledge
6. Poor Preparation
7. Poor Materials
8. Poor Construction Practices
9. Lack of Inspection
10. We do them for the Wrong Reason
How to Construct High Quality Slurry Seal and Micro Surfacing Treatments - Part 1

How to Construct a High Quality Slurry Seal and Micro Surfacing Project - Part 2

How to Construct High Quality Chip Seal Treatments

Other Contact Info

ISSA @ [www.slurry.org](http://www.slurry.org)
ARRA @ [www.arra.org](http://www.arra.org)
AEMA @ [www.aema.org](http://www.aema.org)
NCPP @ [www.pavementpreservation.org](http://www.pavementpreservation.org)