Micro-Surfacing

Surface Correction

To restore desirable surface characteristics such as:

- Skid resistance
- Crack filling
- Weatherproofing
- Raveling
- Aesthetics and uniformity
- Leveling or rut-filling
Micro-Surfacing:

*two primary applications*

1. **Preventive Maintenance** -
   to prevent surface deterioration

2. **Corrective Maintenance** -
   to renew surface characteristics
   including rut filling

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**History of Micro-Surfacing**

1. Aggregate Bin
2. Mineral Binder Bin
3. Additive Storage
4. Material Aggregate
5. Material Micro-Surfacing Emulsion
6. Material Water and Additive
7. Pugmill
8. Micro-Surfacing
9. Surfacing Spreader Box
10. Brown in Black Color
11. Road Water Sprinkler
History of Micro-Surfacing

- Developed in Germany late 1960’s
- Thicker version of conventional slurry
- Applied in narrow courses for ruts
- Incorporated special polymers to promote stability in multi-layers
- Introduced in the U.S. in 1980’s

Description of Micro-Surfacing

“A designed mixture of polymer modified emulsified asphalt, mineral aggregate, mineral filler, water, or other additives, proportioned, mixed, and uniformly spread over a properly prepared surface.”

- ISSA A-143
- State DOT Specifications
- ASTM D-6372-99
**Project Selection for Micro-Surfacing**

- Sound and well-drained surfaces
- No distresses, potholes, and/or cracking
- Appropriate for:
  - Raveling, Oxidized Pavement, Rutting, Rough Pavements w/ Short Wavelengths
- Not Appropriate for:
  - Cracking, Base Failures, HMA Layers

### Applications

<table>
<thead>
<tr>
<th>Applications</th>
<th>Aggregate Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II</td>
</tr>
<tr>
<td>Void Filling</td>
<td>X</td>
</tr>
<tr>
<td>Wearing Course (ADT)</td>
<td></td>
</tr>
<tr>
<td>&lt; 100</td>
<td>X</td>
</tr>
<tr>
<td>100 - 1,000</td>
<td>X</td>
</tr>
<tr>
<td>1,000 - 20,000</td>
<td>X</td>
</tr>
<tr>
<td>&gt; 20,000</td>
<td></td>
</tr>
<tr>
<td>Minor Shape Correction 0.4-0.8 inch (10-20 mm)</td>
<td>X</td>
</tr>
<tr>
<td>Rut-filling</td>
<td>X</td>
</tr>
</tbody>
</table>
Micro-Surfacing Advantages

- Mix can be placed in thicker lifts while remaining stable
- Macro-texture of the mix remains
- Quick setting for traffic
- Enhanced durability

Interstate System

Micro-Surfacing
Major Arterials

Micro-Surfacing

Secondary System

Micro-Surfacing
Comparisons

<table>
<thead>
<tr>
<th>Slurry Seals</th>
<th>Micro-Surfacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• May use polymers</td>
<td>• Always use polymers</td>
</tr>
<tr>
<td>• Thickness equal to largest stone</td>
<td>• Thickness is 2-3 largest stone size</td>
</tr>
<tr>
<td>• Evaporative break</td>
<td>• Chemical break</td>
</tr>
<tr>
<td>• Environmentally-dependent curing</td>
<td>• Non-environment dependent curing</td>
</tr>
<tr>
<td>• Seals- restores surface texture, stops raveling</td>
<td>• Rut-filling, restores surface profile</td>
</tr>
</tbody>
</table>

Expected Performance

Slurry Seals
- Life Extension 3-5 years (good road)
- Longevity 4 to 7 years

Micro-Surfacing
- Life Extension 4-8 years (good road)
- Longevity 6 to 10 years
- Rut-filling performance depends on underlying pavement condition
- Traffic is not a limiting factor
**Typical Life Extensions**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Pavement Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good (PCI=80)</td>
</tr>
<tr>
<td>Slurry Seals</td>
<td>3 - 5 yrs.</td>
</tr>
<tr>
<td>Micro-surfacing</td>
<td>4 - 8 yrs.</td>
</tr>
</tbody>
</table>

**Impact on Winter Maintenance**

**Both Slurry Seals and Micro-Surfacing**

- Outstanding bare pavement friction is achieved due to the surface texture.
- Good friction achieved without deicing chemicals during the initial on-set of unexpected snowy or icy conditions.
- More salt and deicing chemicals may be needed after the on-set of snowy or icy conditions.
### Application Rates

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Aggregate Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>Slurry Seals</td>
<td>8-12 lb/yd²</td>
</tr>
<tr>
<td></td>
<td>(4.3-6.5 kg/m²)</td>
</tr>
<tr>
<td>Micro-surfacing</td>
<td>10-20 lb/yd²</td>
</tr>
<tr>
<td></td>
<td>(5.4-10.8 kg/m²)</td>
</tr>
</tbody>
</table>

### Application Thickness

- Type I - Slurry
  - 1/8”
- Type II - Micro
  - 3/8”
- Micro 28# - 2FA
  - ¼”
- Micro 38# - 3FA
  - ½”
- Micro 50# - 4FA
  - 5/8”
- Micro Rut-fill
  - 1”
Specifications

Method Based
- Design, materials, methods, payment

Performance Based
- Define outcomes
- Immediate response safety problems
- Flexibility
- Risk shifted to contractor
- Partnership between agency/contractor

Specifications (cont)

Warranties
- Description of work, definitions
- Initial acceptance terms
- Warranty bond description
- Rights and responsibilities of parties
- Evaluation method
- Requirements and conflict resolution
- Non-extension of contract
- Measurement and payment
Responsibilities

Paving Inspector
- Adherence to Specifications
- Document quantities
  - Placed versus planned
- Actual rate of spread
  - Too little or too much placement

Methods of Payment

Slurry Seal
- Materials, equipment, cleaning labor, bond coat, mix placement

Micro-surfacing
- Standard: paid by area
- Rut-filling: paid by weight
- Materials, equipment, labor, cleaning, marker replacement, tack coats
Keys To Success

- Site Selection
- Equipment Calibration
- Material Consistency
- Contractor Performance
- Project Inspection
- Information

Questions?