Axys and Onyx

Mastic Surface Treatments for Pavement Preservation
Mastic Surface Treatments

- Mixture of asphalt emulsion, fine aggregate, polymers, and performance additives to enhance adhesion & durability.
  - Emulsion formulated with specific chemistry to improve cure time.
  - Synthetic aggregate resistant to wear.
  - Mixture forms a mastic structure to improve durability.

- Combines aspects of Slurry Seal (mixture) & Fog Seal (sprayed).
- Spray applied with unique construction equipment in two passes. The total application rate should be 0.25-0.30 gallons/\text{yd}^2.
MASTIC SURFACE TREATMENTS

Lower Cost

Why Mastic?

MIND THE GAP

Fogseal
.80 lbs/yd²
$.75-$1.85

Mastic Surface Treatment
2.5-3 lbs /yd²
$1.00-$1.25

Sand Seal
12-15 lbs/yd²
$1.30-$1.75

Chip /Slurry Seal
15-18 lbs/yd²
$1.50-$2.50

Micro Surfacing
15-30 lbs/yd²
$2.25-$2.75

Thinlift HMA
85-110 lbs/yd²
$3.50-$6.00

Higher Cost

Why Mastic?
Mastic Surface Treatments Manufacture

- Central plant
- Mix system on load cells - consistency
  - Aggregate
  - Mineral Fines
  - Polymer
  - Asphalt Emulsion
  - Water
- Testing on mix performed at plant
Mastic is produced as complete mix and shipped ready to use.

Aggregate remains suspended in the mastic with mixing for a few minutes every day.
Mastic Surface Treatments

Application & Best Practices

Application Equipment

• Specialized distributor
• Full sweep agitation
• Pumps that can handle aggregate content
• Spray bar & nozzles that can distribute mixture
Mastic Surface Treatments

Additional Equipment
Mastic Surface Treatments

Application & Best Practices

Best Practices

- Road should be in “Good” condition
- Pavement should be swept, clean, & no excessive moisture
- Prepare as you would for most preventive maintenance treatments
- 2 coat application aids coating & drying
- Ambient temp of 60 F and rising with no expected moisture or freezing temperatures.
Mastic Surface Treatments

Product Attributes
Describe Product Performance
Important to the customer/consumer
Can be measured
# Mastic Surface Treatments

## Product Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Test</th>
<th>Unit of Measure</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction</td>
<td>DFT</td>
<td>$U_f$</td>
<td>Impact on Friction</td>
</tr>
<tr>
<td>Durability</td>
<td>Wet Track Abrasion Test (WTAT)</td>
<td>g/m²</td>
<td>Is it tough</td>
</tr>
<tr>
<td>Permeability</td>
<td>NCAT Permeameter</td>
<td>Coefficient</td>
<td>Resist Water</td>
</tr>
<tr>
<td>Dry Time</td>
<td>Dry Time Test</td>
<td>Minutes</td>
<td>How fast to get back on it</td>
</tr>
<tr>
<td>Release to Traffic/Cure</td>
<td>Dry Time Test</td>
<td>Minutes</td>
<td>How fast to open to traffic</td>
</tr>
<tr>
<td>Color</td>
<td>Munsell Neutral Scale</td>
<td>Number</td>
<td>Blackness</td>
</tr>
<tr>
<td>Tackiness</td>
<td>Zapon</td>
<td>Seconds</td>
<td>Will it get tacky in high heat</td>
</tr>
</tbody>
</table>
Composition Comparison

- Fog Seal
- Mastic Sealer
- Micro / Slurry Seal
- Chip Seal
- Hot Mix

Legend:
- Aggregate
- Fines
- Asphalt
- Polymer
Mastic Surface Treatments

Specifications
Specification Sections:
• Emulsion & Aggregate
• Performance Tests (Mix Design)
• Application & Equipment Guidelines
Mastic Surface Treatments

Specifications

Emulsion & Aggregate:

2.1 EMULSIFIED ASPHALT

A. Use emulsified asphalt, grades CSS-1, or CSS-1h, in accordance with Table 1

<table>
<thead>
<tr>
<th>Table 1 – Emulsified Asphalt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criterion</strong></td>
</tr>
<tr>
<td>Viscosity, Saybolt Furol at 77°F, seconds</td>
</tr>
<tr>
<td>Particle Charge Test</td>
</tr>
<tr>
<td>In case of inconclusive particle charge, material having a maximum pH value of 6.0 will be acceptable as a CSS type</td>
</tr>
<tr>
<td>Sieve %</td>
</tr>
<tr>
<td>Residue by Distillation, percent</td>
</tr>
<tr>
<td>Penetration at 77°F, 100 g, 5 seconds (Test on Residue from Distillation)</td>
</tr>
</tbody>
</table>
Mastic Surface Treatments

Specifications

Aggregate:

<table>
<thead>
<tr>
<th>Table 2 - Aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Properties (a)</strong></td>
</tr>
<tr>
<td>Criterion</td>
</tr>
<tr>
<td>Water Absorption, percent</td>
</tr>
<tr>
<td>Micro-Deval, percent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gradation (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sieve</strong></td>
</tr>
<tr>
<td>No. 8</td>
</tr>
<tr>
<td>No. 16</td>
</tr>
<tr>
<td>No. 30</td>
</tr>
<tr>
<td>No. 60</td>
</tr>
<tr>
<td>No. 100</td>
</tr>
<tr>
<td>No. 200</td>
</tr>
</tbody>
</table>

a) Perform physical property tests on aggregates that are received before blending into sealer.
b) Micro Deval on aggregate larger than #60 sieve U.S.
c) Includes all mineral components.
## Mastic Surface Treatments

### Specifications

Performance Tests (Mix Design):

### Table 3

<table>
<thead>
<tr>
<th>Test</th>
<th>Standard</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet-Track Abrasion Loss (3 day soak), g/m² (a)</td>
<td>ISSA TB 100 D3910</td>
<td>--</td>
<td>80</td>
</tr>
<tr>
<td>Asphalt content by Ignition Method, percent</td>
<td>AASHTO T 308</td>
<td>30</td>
<td>--</td>
</tr>
<tr>
<td>Dynamic Friction Test Number @ 20 kph (ratio)</td>
<td>E 1911</td>
<td>0.90</td>
<td>--</td>
</tr>
</tbody>
</table>

**NOTES**

(a) Use the modified method to account for realistic application depth and fine emulsion mixture.

(b) Establish base friction value using prepared laboratory compacted slab of approved mix as surface to be tested. The Dynamic Friction Test (DFT) number ratio should indicate that after application of the mastic seal, the surface retains required minimum percentage DFT number of the original pavement surface.
Mastic Surface Treatments

Specifications

Application & Equipment:

3.1 CONSTRUCTION EQUIPMENT
A. Distribution equipment

1. Mixing Equipment. All materials shall be thoroughly mixed as to produce a homogenous surface treatment. Individual volume or weight controls for proportioning each material in the mix shall be provided. Materials shall be added by a calibrated controlled device capable of monitoring the amount of material used at the time.

2. Distribution Equipment. The distributor shall be equipped with a full sweep agitation system, a pumping system designed to handle fine aggregate mixes, and sufficient power to operate the full spray system and the agitation system at the same time. The distribution equipment shall be equipped with a monitoring system that ensures the even distribution of material and measures the application rate of the mix.

3. Storage Tanks. If the mix is being delivered from a central mixing plant, then a job site storage tank shall have the minimum capacity of the entire transport load. The storage tank shall have an internal full sweep mixing system having a mixing capability of providing a homogenous mix representing the mix design at any given location within the tank.

4. Environmental Protection. The contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment.

3.3 APPLICATION
A. General:

1. Two separate application coats are required. The first application must be thoroughly set and free of any damp areas before the second application begins.
2. Make straight lines along lip of gutters and shoulders. Keep same thickness in these areas. No runoff on these areas will be permitted.

B. Application Rate: Based upon weigh tickets and yield tests

1. First coat is 0.10 to 0.15 gallons per square yard
2. Total quantity after second coat is 0.25 gallons minimum
3. Application Rate: adjust according to surface conditions, only after obtaining review by ENGINEER

C. Placement

1. Application should be even and free of obvious light and heavy area
2. Do not reduce application rate along edges or around manhole covers
3. Make straight lines
4. Hand sprayers & squeegees to apply mix in areas that cannot be reached with distribution spray bar
   a. Provide complete and uniform coverage
   b. Avoid unsightly appearance from handwork
Mastic Surface Treatments Summary

Cost effective pavement preservation tool ($1.00–$1.25 SY)
~4,000 to 5,000 lane miles placed in last 4 years
Rapidly growing segment with influx of industry investment
Where can this treatment be used?
Mastic Surface Treatments

- Shoulders & Rumble Strips
- County Roads
- Residential Streets
- State Highways
Mastic Cape Seal
Crawford County Ohio-2016
Strawser Construction Inc.

Before
Mastic Surface Treatments

Questions?