Surface Treatments: Conventional and Modified

A Surface Treatment is...
- Single layer of asphalt emulsion
- Followed by a single layer of aggregate
- AKA – Chip Seal

Chip Seal Alternatives
- Double Chip Seal – Two Applications
- Fiber Chip Seal – Glass Fibers Between Liquid Applications and Subsequent Stone
- Rubber Modified – Precoated Stone with Rubber Modified Asphalt
- Cape Seal – Chip Seal Covered By Slurry

A Good Surface Treatment Will:
- Protect the underlying pavement
- Slow pavement oxidation
- Waterproof
- Seal small cracks
- Improve skid resistance
- Extend service life

What A Surface Treatment Is Not……
- Is not a structural layer
- Will not smooth and level
- Will not correct structural defects
- Will not fill large cracks

HOW DO WE GET TO HERE?
SURFACE PREPARATION

- Weeks / Months in Advance
  - (if possible)
    - Patch potholes
    - Fill wheel ruts
    - Fill / Seal cracks

Construction Equipment

- Bituminous Material Distributor
- Haul Trucks
- Aggregate Spreader
- Pneumatic Tire Rollers
- Power Broom
- Vacuum Truck
- Traffic Control Equipment

MATERIAL REQUIREMENTS

- Asphalt Emulsion
  - AADT <2000
    - RS-2P, HFRS-2P, CRS-2P
  - AADT > 2000 (or heavy truck traffic)
  - Modified Asphalt Hardness
- Emulsion – Shoulders Only
  - HFMS-2p

Material Requirements (cont)

- Aggregate
  - NYSDOT #1 st
    - Required Over 2000 AADT
  - NYSDOT #1a
    - Option up to 2000 AADT
    - Bike & Pedestrian Friendly

Aggregates for surface treatments

- One-sized
- Cubical
- Clean
- Angular
- Durable

Aggregate Grading

<table>
<thead>
<tr>
<th>Screen</th>
<th>% Passing</th>
<th>Screen</th>
<th>% Passing</th>
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<tbody>
<tr>
<td>½ inch</td>
<td>100 %</td>
<td>½ inch</td>
<td>100 %</td>
</tr>
<tr>
<td>¼ inch</td>
<td>0 – 15%</td>
<td>⅛ inch</td>
<td>90 – 100%</td>
</tr>
<tr>
<td>#200 (3)</td>
<td>0 – 1 %</td>
<td>#200 (3)</td>
<td>0 – 1 %</td>
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Factors Affecting Emulsion Rate

- Aggregate size
  - Larger aggregate—increase rate
  - Smaller aggregate—decrease rate
- Existing surface
  - Dry pocked surface—increase rate
  - Flushed smooth surface—decrease rate

Factors Affecting Emulsion Rate cont...

- Traffic
  - AADT
    - High—lower rate
    - Low – higher rate
- Percent trucks
  - High – lower rate
- Aggregate absorption

Typical Application Rates

- Emulsion
  - #1’a 0.30 – 0.40 gal/sq.yd
  - #1 st 0.35 – 0.45 gal/sq.yd

- Aggregate
  - # 1 a 17 – 20 #/sq.yd
  - # 1 st 22 – 25 #/sq.yd

Pre - Checklist

- Signs
- Paperwork
- Aggregate certifications
  - Gradations
- Emulsion certifications
  - Proper type
- Calibrations
- Aggregate spreader
- Emulsion distributor

Pre-Checklist (cont)

- Check treatment design
  - Emulsion type and rate
  - Aggregate size and rate
- Surface Preparation
  - Pavement marking removal
  - Sweeping/Cleaning of existing surface
- Weather
  - Surface temperature 60F and rising
  - Humidity less than 95%

Checklist after starting

- Check distributor nozzles
- Check mat for even coverage
- Check that aggregate spreader is close to the distributor (usually 50-200ft)
- Check aggregate spreader gates
- Check mat for even coverage
- Check that rollers start rolling in timely manor
Checklist after starting (cont)

- Check for proper embedment after rolling (approx. 55% - 65%)
- Check that traffic is maintained at a controlled speed (15mph max) until emulsion has set.

Look for uniform spray pattern
- triple over lap
- no plugging

❖ Aggregate spreader, note the nice uniform spreading of aggregate

❖ Rolling of a Surface Treatment
Note the emulsion around the aggregate, this is the look that you should have, too much aggregate and the aggregate will not 'lock down'. Not enough aggregate and the surface treatment will bleed.

This is how the aggregate should look in the emulsion during the different stages of construction and completion:

- Immediately after Chipping - should start within 5 mins. after application of aggregates
- Pneumatic Tires: +/- 80 psi
- 12 Ton Minimum
- Stop After Set
- Traffic shall be maintained at a speed not to exceed 15 miles per hour for a period of 4 hours unless agreed upon by the contractor and the engineer.
- A minimum of 3 passes are required within 30 mins. of the application of aggregate.

Avoid this dirty aggregate condition.
Fog and Sand Treatment

- A light application of emulsion followed by a light application of a cover sand
- Helps reduce damage/stone loss caused by snow plows
- Helps retain pavement markings
- Helps keep de-icing material near pavement surface

Components of Fog Treatment

Material Requirements:

- Emulsion Type: HFMS-2h, SS-1h, or CSS-1h diluted
- Application Rate: .04 gals/yd² to .15 gals/yd²
- Aggregate Type: Clean Processed Sand (conforming to the requirements of 703-01, Fine aggregates)
- Aggregate Application Rate: 2 lbs/yd² to 5 lbs/yd²

Sand Gradation

<table>
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<td>90-100</td>
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<tr>
<td>#200</td>
<td>0 - 2</td>
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Fog Treatment

- Elapsed time between surface treatment and fog coat – 1 day minimum (allowing surface treatment time to set)
- Time required to complete fog treatment - one day or less
- Single pass rolling all that is required

An Aggregate Spreader used to spread cover sand for Fog and Sand treatment, note the light coverage of Sand. (2lbs/yd² to 5lbs/yd²)
A Typical fog and sand treatment for NYSDOT in Chautauqua County, Region 5 on Rt. 474.

A typical Fog and Sand treatment just after completion /before traffic.

Surface Treatment Benefits
- Preserves and protects existing pavement
- Green
- Improves skid resistance
- Lasts 3 yrs – 7 yrs
- “Most economical method of maintaining a pavement surface”

Scott Shuler, Director of Research Asphalt Institute