Pavement Preservation with Microsurfacing & Chip Seal

Microsurfacing Definition

Laboratory designed mixture of polymer modified asphalt emulsion, aggregate, mineral filler, water and other additives accurately proportioned, mixed and uniformly spread over a properly prepared surface.

Governing Specifications

Microsurfacing

- ISSA A 143
- ASTM D 3910
- FAA P-635
- State DOT’s and Local Specifications

Two Primary Uses

- Preventive Maintenance
  - To prevent surface distresses in good pavements
- Corrective Maintenance
  - To correct surface distresses in older pavements

Capabilities Microsurfacing

- Seals the surface (prevents further weathering of the underlying pavement)
- Restores surface texture
- Provides new wearing surface
- Fills cracks and voids
- Corrects other distresses
  - Leveling Course
  - Rut Filling

Component Materials

Microsurfacing Aggregate

- The aggregate shall be a manufactured crushed stone such as granite, slag, limestone, chat or other high-quality aggregate or combination thereof.
- Meet project specifications
- Consistent within specification

Microsurfacing Emulsion

- Polymer Modified Emulsified Asphalt (CSS-1HP)
  - Modified with Natural Latex or Synthetic polymers

Mineral Filler

- Portland Cement, Hydrated Lime or Aluminum Sulfate
- Water
- Additives (for break control)
Mix Design Procedure

- Mix Design Request
- Individual Component Analysis
- Initial Mix Trials
- Proportion Optimization
- Performance Testing
- Final Formulation Adjustments

Surface Preparation

- Crack Sealing
- Patching
- Protection of Utilities
- Blowing
- Sweeping

How is it applied?

Application Equipment

- Truck Mounted Unit
- Continuous Run Machine

Truck Mounted Unit

Continuous Machine
Where Can Microsurfacing Be Used?

Variations:
- Type I
- Type II
- Type III

Residential Streets
- Parking Lots
- Airports

Basic Gradations of Slurry Seal

**TYPE I**
- Type (Fine)
- 8 - 12 lbs./yd$^2$
- $4.3 - 6.5$ kg/m$^2$
- AGGREGATE
- 10 - 16 % Residual Asphalt

**TYPE II**
- Type (General)
- 10 - 20 lbs./yd$^2$
- $5.4 - 10.8$ kg/m$^2$
- AGGREGATE
- 5.5 - 13.5 % Residual Asphalt

**TYPE III**
- (Coarse)
- 13 - 30 lbs./yd$^2$
- $8.1 - 16.3$ kg/m$^2$
- AGGREGATE
- 5.5 - 12 % Residual Asphalt
4 Lane Highways

Interstates

2 Lane Highways

Divided Highways

Residential

Arterials

Other Ideal Applications for Microsurfacing

Collector Roads

Shoulders

Milled Surfaces

Cape Seal

Chip Seal followed by Microsurfacing

Filling ruts with Microsurfacing

Consolidation Ruts

Methods:
- Leveling/Scratch Course
- Rut Filling Course
Typically followed by a surface course
**Leveling (scratch) Course**

Ruts ½” or less

**Rut Filling with Microsurfacing**

Ruts greater than ½”

**Benefits**

- 1/4 to 1/3 cost of Hot Mix
- No milling required
- No build up at curb line
- Utility casting adjustment not necessary
- Minor inconvenience to traveling public
- High production levels leads to less time on project
- Eco-Friendly

**Keys To Success**

- Proper site selection
- Good specifications (enforced) & Mix Design
- Proper roadway preparation
- Proper equipment (match equipment to project)
- Accurate equipment calibration
- Material consistency (use materials with history of past performance)
- Contractor performance (use seasoned workforce)
- Quality project inspection
- Agency – Industry Partnering
- Information

**Chip Seal**
A Chip Seal is...

- Application of an asphalt binder to a roadway surface followed by application of aggregate which is then rolled & swept prior to returning the roadway to service.

A good chip seal can...

- Provide all-weather surface
- Protect the underlying pavement
- Waterproof the road’s surface
- Seal small cracks
- Improve surface friction
- Extend service life
- Improve safety
  - By improving skid resistance

Where can Chip Seals be Applied?

- Over prepared base
- Two lane rural roads
- Secondary Highways & Routes
- Interstate Highways
  - Requires site specific materials & applications
  - Depends on Agency tolerance level.

How is it applied?

- Asphal distributor
- Asphal distributor

- Now
- Then

- SEAUPG 2009 CONFERENCE-HILTON HEAD ISLAND, SOUTH CAROLINA
Chip Seal Binder Variations
- Hot Tire Rubber
- Hot Asphalt Cement
- Conventional Asphalt emulsions
- Polymer Modified Emulsions
- Rejuvenating Emulsions
- Cutbacks

Aggregates Natural & Synthetic
- Crushed gravel
- Crushed stone
- Limestone
- Basalt (Trap Rock)
- Expanded Clay & Shale (lightweight)

Chip Seal quality depends on
- Site Selection
- Project Specific Design Factor
- Condition of surface
- Quality materials (consistency)
- Clean Aggregate
- Well maintained equipment
- Contractor performance
- Application technique
- Traffic control
- Weather (avoid cool weather applications)
- Seasonal limitations apply

Chip Seal quality con’t
- Timely, quality prep work (90-180 days ahead)
- Project specific specifications (Understand that plans are only a guide and that each road requires special considerations)
- 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.
Average Cost of Maintenance

- 1 1/2" HMAC: $95,000.00 - $103,500.00
- Milling – Less than 3": $23,500.00 – $40,000.00
- Fog Seal (conventional): $4,500.00 - $5,500.00
- Fog Seal (rejuvenating emulsion): $7,000.00 - $8,000.00
- Slurry Seal: $19,500.00 - $23,500.00
- Micro Surfacing (single): $24,000.00 - $27,000.00
- Micro Surfacing (double): $48,000.00 - $54,000.00
- Chip Seal: $18,000.00 - $25,000.00
- Poly-Con (materials only): $70,000.00 - $90,000.00

Per mile 20' wide

Summary
Microsurfacing & Chip Seals are Excellent Pavement Preservation Tools

Sources of Information
- International Slurry Surfacing Association: www.slurry.org
- Asphalt Emulsion Manufacturers Association: WWW.AEMA.org
- FP2, Inc.
- National Center for Pavement Preservation: www.vancebrothers.com

Questions

Thank You!
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