Pavement Preservation Techniques

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Introduction

- Definition of Pavement Preservation
- INDOT Status
- Fog Seal
- Chip Seal
- Full Depth Reclamation
Pavement Preservation 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.”

Source: FHWA Pavement Preservation Expert Task Group
INDOT’s Pavement Preservation Status

- Looking at new and improved pavement preservation materials and methods
- Revising current specs and techniques
- Hosting Pavement Preservation related training:
  - National Center for Pavement Preservation (2007)
  - Asphalt Emulsion Workshop (April 2008)
Midwest Pavement Preservation Partnership (MPPP)

- Provides a regional partnership of state, provincial, and local agencies, as well as contractors and material suppliers.
- Goal is to promote pavement preservation through sharing experiences.

See NCPP’s website for details:
www.pavementpreservation.org
Definition:

A fog seal is a light application of a diluted asphalt emulsion to the pavement surface.

Benefits of a Fog Seal:

- Seal surface (waterproof)
- Arrest stone loss (light raveling)
- Improve appearance (contrast)
Asphalt Rejuvenation

- National Sealer/Binder Study
- Application of a rejuvenating agent to an asphalt surface
- Chemically softens the top layer (~1/2”)
- Reduces age related hardening

Report Available on NCPP’s Website: www.pavementpreservation.org
Fog Seal Applications

- Aged, brittle, “dry” pavement
- Chip sealed surfaces
  - Reduce dust
  - Lock in loose chips
    - Less chance of windshield damage
    - Reduce snow plow damage
  - Provide black surface
    - Better pavement marking contrast
    - Black surface = higher heat absorption = faster cure
- Shoulders
Beware: Fog Seal

- Friction problems
  - Ensure surface to be treated can absorb the sealant
    - Open grade
    - High macrotexture (like a chip seal)
  - Overall good friction
    - Fog seal may cause an initial drop in friction numbers
- Stripping problems
  - Fog seal, by definition, seals the pavement surface
Equipment

- Asphalt Distributor
  - Ensure proper nozzles
    - Low application rate (0.10 gal/SYD)
  - Ensure proper calibration
    - Low application rate – little wiggle room

- Power Brooms
  - Clean, dust free surface a must
Material

- **Diluted Asphalt Emulsion**
  - Want in range of 30% asphalt (can do less)
  - Need hard base asphalt (don’t want a tacky surface)
  - Fairly slow setting (needs to penetrate small cracks and voids before setting)
  - Apply at ~125° F

- **Sand** – want on site to blot any puddles
US 36 Full Width Shoulders

- First INDOT Experience
- East of Danville to CR 525 E in Hendricks County
Determine Application Rate

- 3 Test Patches:
  - 0.08 gal/SYD
  - 0.10 gal/SYD
  - 0.12 gal/SYD
Application

- Good practice – start and stop on building paper.
Application

During Application ~20 Minutes
After Cure

Before Treatment

After Treatment
Finished Product

US 231 HMA

US 36 PCCP
Problems Encountered

- “Shadowing”
  - Solution: Slow down distributor
Problems Encountered

**Clogged Nozzles**

**Solutions:**

- Ensure distributor was emptied of previous material.
- Ensure proper calibration.
Fog Seal Cost

- US 36 Shoulder Costs: $0.16/SYD

Fog Seal Cost Breakdown

- Labor: $443.19
- Equipment: $488.33
- Material Cost: $8,757.45
Chip Seal

- **Definition:**
  - A chip seal consists of an application of asphalt material to the pavement surface, followed immediately by a layer of coarse aggregate.

- **Benefits of a Chip Seal:**
  - All of a Fog Seal, plus
  - Provides new wearing surface
  - Improves friction numbers
Dr. Scott Shuler (Colorado State University) will give an abbreviated version of NCPP’s “Chip Seal Best Practices Training”

Wednesday morning, 10:30 session, Room ???
Chip Seal Study

- 3 year J TRP study into chip seals
- Will explore different materials
  - Aggregate (see display)
  - Emulsions
- Will develop a design method for INDOT
- Study includes a survey of practice
  - Please fill out and return!
INDOT currently experimenting with chip seal designs – using combination of MNDOT and PennDOT methods

- MNDOT is computer based – available on their website:
  http://www.mnroad.dot.state.mn.us/research/MnROAD_Project/restools/sealcoatprogram.asp

- Design gives target/starting application rates for stone and emulsion
Chip Seal Design – cont’d

- Requires common lab tests on aggregate:
  - Gradation
  - Unit Weight
  - Absorption
  - Flakiness Index
  - FI of 0 is perfect cube
Chip Seal Best Practices

- Clean pavement prior to sealing
Chip Seal Best Practices

- Apply stone IMMEDIATELY after emulsion
Chip Seal Best Practices

- Don’t overapply stone: Ideally, 1 stone thick
Chip Seal Best Practices

- At least 3 complete roller coverages, 1st should be before emulsion sets.
Chip Seal Best Practices

- Joints – watch overlap when starting or stopping
Chip Seal Best Practices

- Sweeping – if possible, lightly broom at end of day.
Chip Seal Best Practices

- Polymer modified emulsion (AE-90S)
Full Depth Reclamation

Definition: Pavement is pulverized, full depth, mixed with emulsion and cement, graded, compacted, and topped with a new wearing course.

Benefits:
- Equivalent to a major rehabilitation
- Can widen and correct cross slope problems
- Useful for projects where an overlay would require extensive deep patching

FDR Information Booklets available
FDR Process

Deep recycled layer

Injection of water and/or fluid stabilizing agents

Operating direction

Milling drum

Distressed pavement

Granular material
Full Depth Reclamation Process

- Pulverization – pavement is ground up, down to subbase (typically 8")
Full Depth Reclamation Process

- Initial grading – after pulverization, material is rough graded and compacted.
Full Depth Reclamation Process

- Injection – material is re-pulverized, injected with emulsion and cement, and final graded and compacted.
Full Depth Reclamation Process

- Wearing course – after minimum 5 day cure, FDR is capped with a wearing course.
  - INDOT used 4” HMA – total structure of 12”
Questions???

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