Combining Preservation Treatments

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...Preservation involves a paradigm shift from “worst first” to more proactive “optimum timing”...

FHWA Action Memo
May 12, 2005
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.”

FHWA Pavement Preservation Expert Task Force

An Effective Preservation Program

- Addresses good pavement ahead of distresses, (typically 4–7 yrs. old)
- Applied @ the right time pavement is restored to almost new condition
- Cumulative effect of treatments postpone rehab and reconstruction
- Less expensive in the long run
- Less disruptive to traffic
Minor Rehabilitation

“...consists of non-structural enhancements made to the existing pavement sections to eliminate age-related, top-down surface cracking that develops in flexible pavements due to environmental exposure. Because of the non-structural nature of minor rehabilitation techniques, these techniques are placed in the category of pavement preservation.”

AASHTO Hwy Subcommittee on Maintenance
Preventive Maintenance

“…a planned strategy of cost effective treatments to an existing roadway system and it’s appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system without significantly increasing the structural capacity.”

AASHTO Standing Committee on Highways

…one of my favorites…

“…something that you put on a road a year before you need it…”

Mid 1970’s
Maintenance Engineer VDOT
Pavement Preservation is not new...

…it’s just doing the right thing, at the right time, to the right pavement.
**SOME MINOR REHABILITATION TREATMENTS**

- Thin & Ultra-Thin HMA overlays
- Hot-in-Place Recycling
- Cold-in-Place Recycling

**SOME PREVENTIVE MAINTENANCE TREATMENTS**

- Crack Treatments
- Fog Seals
- Chip Seals
- Slurry Seal
- Micro Surfacing
- Micro Milling
Crack Treatments

- Crack Filling – Non-working cracks
- Crack Sealing – Working (thermal) cracks, rout for longer life
- Typically hot applied
  - Asphalt rubber
  - Fiber added to PG Graded asphalt
- Waterproof pavement prior to other treatments

Fog Seals

- Inexpensive way to rejuvenate and seal pavements
- Site selection critical (good condition, chip seal, rumble strips, slurry seal, etc.)
- Slow setting emulsion diluted up to 3 parts water, no cover aggregate used
- Application rate varies w/surface (0.1–0.15 gal/SY)
- Life span 1–2 years, can re-apply
Chip Seals

- Uniform application of asphalt binder on a sound surface followed by placement of cover aggregate then seated with roller
- Seal surface from water intrusion
- Can be placed in multiple layers using different sized aggregate
- Used as SAMI layer prior to other treatments (Cape Seal, HMA)

Slurry Seal

- Blend of crushed aggregate (#10 stone) & asphalt emulsion
- Match aggregate to desired texture
- Mixed and spread in a mobile operation as thin wearing surface
- Cape Seals
- Can be used as a SAMI
- Over old slurry
Microsurfacing

- Similar in many ways to Slurry with regard to site selection, Cape Seals on busier roads
- Polymer modified emulsion
- Can place multiple lifts, using different sized aggregates
- Level consolidation ruts prior to HMA

Recycling

- Hot in Place
  - Surface recycling, re-working top ¾” – 1”
  - Interrupt top-down cracking
  - Add rejuvenator to oxidized pavement
  - Prepare surface for other treatments

- Cold in Place
  - Mill up to 4” of existing surface
  - Re-size millings, blend with emulsion
  - Place new surface, can be sealed w/slurry or other treatments
Thin HMA Overlays

- Non-structural overlays
  - Thin Bonded Wearing Course
  - 4.75 mm HMA

- Place on prepared surface
  - Micro Milled
  - Crack sealed
  - Rut Filled w/Microsurfacing

How Far Can I Go?

- Successful jobs start with sound pavements

- Do we sometimes push the limits?

- Combining treatments may give sense of security…be realistic
Crack Treatment Combination Benefits

- Eliminates moisture intrusion into base
- Maintains flexible seal of crack if surface fractures
- Cost effective combination. Surface Treatments alone are thin, brittle overlays w/little crack penetration
HIP (Surface Recycling) Benefits

- Eliminate surface cracking and old patches
- Restore road profile
- Add rejuvenator to older asphalt pavements
- Uniform template for variety of surfacing choices (Slurry, Micro, Chip seal, HMA)
Double Chip Seal Benefits

- Smaller cover aggregate “locks in” larger surface treatment stone
- Excess whip-off eliminated
- More acceptable surface during cure time prior to Slurry/Micro
- Less surface voids allow for lighter slurry application
Microsurfacing Combinations

• Rutfilling prior to micro or HMA
• Double Micro applications
  • Over milled surface
  • Using two different aggregate sizes for desired texture
  • Same aggregate size both applications
  • In combination w/crack sealing
• Unique situations
...some other Slurry Surfacing Combinations...
Some General Benefits

- Enhanced performance
  - Safety (skid resistance, eliminate hydroplaning, color delineation)
  - Extend service life
  - Durability
- Economical options compared to conventional methods, (i.e. mill & inlay)
- Treatments customized for each application
- Public acceptance

Budget vs. Miles Comparison

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<th>Budget Dollars (% of Total)</th>
<th>Completed Miles (% of Total)</th>
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Pavement Preservation

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

The Right Treatment applied to the Right Pavement at the Right Time

Pavement Preservation

(Three Primary Uses)

• Preventive Maintenance
  – To prevent surface distresses in good pavements

• Corrective Maintenance
  – To correct surface distresses in older pavements

• Reactive Maintenance
  – To provide a stop gap measure (buying time) until more significant funding becomes available
Pavement Preservation
(Is it ok to use PP treatments for reactive maintenance?)

Stop-Gap, Buying Time

- Identify the need and set a goal
- Understand your goal
- Select the proper treatment or combination of treatments
- Educate Everyone!
  - The Agency
  - The Public
  - “Communicate realistic expectations when using pavement preservation as stop-gap measure.”

American Infrastructure Summer 20011

"Many have no choice but to use pavement preservation as stop gap measures, a process otherwise known as reactive maintenance.”

![Graph showing Pavement Condition Index](attachment:image)

**PAVEMENT CONDITION INDEX**

- Excellent
- Good
- Fair
- Poor
- Very Poor
- Failed

**AGE OF PAVEMENT**

- PP = Pavement Preservation
- RM = Reactive Maintenance

- $2.00 for PP Here
- $4.00 for RM Here
- Reactive Maintenance
- Results will vary based on PCI

- Will Cost $12.00 to $16.00 for Rehabilitation Here

75% of life

40% drop in quality

12% of life

40% drop in quality
Surface Treatments Moving Along the Curve

- Fog Sealing
- Crackfilling
- Slurry/Microsurfacing/Chip Seals
- Cape Seals
- 3 Step Process
- Cold In Place
- Reconstruction

Marriage Over Time

- Roses
- Dinner
- Spa
- Holiday
- Jewelry
- Sports Car
- Legal Bills
Pavement Preservation

• The use of pavement preservation surface treatments on structurally unsound pavements can give the agencies who specify the treatments and the contractors who apply them a bad name. And, it could certainly tarnish the value and future use of the treatments themselves.

Fog Seal

Asphalt Emulsion Manufacturers Association
Definition:
a light spray application of diluted asphalt emulsion used primarily to seal an existing asphalt surface to reduce raveling and enrich dry and weathered surfaces
Fog Seal over Chip Seal

Fog Seal over Chip Seal
Chip Seal with a light fog seal

Fog Seal material consisting of 3 parts water, one part asphalt emulsion. Applied at .05 to .10 gals/sqy

Fog Seal over Chip Seal
Fog Seal over Slurry Seal

Fog Seal Application
Fog Seal over Slurry Seal

Slurry Seal before Fog Seal
Slurry Seal after Fog Seal

Fog Seal Combination Benefits

**Chip Seal**
- reduction of dust
- improved chip retention
- improved appearance
- improved pavement marking visibility
- increased binder content
- end user satisfaction

**Slurry & Microsurfacing**
- improved appearance
- improved pavement marking visibility
- improved surface characteristics
- reduces exposure to loose material (FOD)
- increased binder content
- end user satisfaction
Cape Seals

A cape seal is the application of any type of chip seal followed by one or more layers of a slurry seal or micro surfacing.

Chip Seals – Application of a binder, emulsion or hot asphalt, covered with an application of a uniform sized aggregate.
- Conventional asphalt emulsion
- Polymer modified emulsion
- Rejuvenating emulsions and scrub seals
- Hot Applied Rubberized chip seal
  - Terminal Blend Asphalt Rubber Chip Seal, pre coated chips
Cape Seals

• Type I, II or III Slurry Seal or Microsurfacing
  – Conventional Emulsified Asphalt slurry seal
  – Polymer modified slurry seal
  – Rubberized slurry seal
  – RAP (Reclaimed Asphalt Pavement) slurry seal
  – Microsurfacing

Cape Seals

Pavement Conditions

• Conventional or Polymer Modified Emulsions
  – Used on Good Condition Pavements
  – As Preventive/Corrective Maintenance

• Rejuvenating Emulsions
  – Used on aged surfaces
  – Minor to moderate cracking
  – Preventive Maintenance

• Scrub Seals aid in crack sealing
Chip Seal
Traditional Spray Application

Scrub Seal Application
Aggregate Application

Chip Seal prior to Microsurfacing
Cape Seal
Microsurfacing over Chip Seal
Chip Seal / Microsurfacing
Cape Seal

Proper Notification

- Community out reach: When projects have a mix of treatments, the public does not understand the difference in cost. They do see the difference on the street.
- Explain all processes prior to start of work. Then notify again before each phase.

Cape Seals
Cape Seals

Going the Extra Mile

- Fog seal the chip seal:
  - Allowing traffic to provide additional rolling of the chip seal will help seat the stone
  - Seating the stone prior to application of slurry or micro surfacing will reduce the chance of "bleeding or flushing"
  - Application of Fog seal greatly reduces the chip loss prior to final surface application

Cape Seal Benefits

- Capable of extending the life of pavements in conditions far worse than recommended for a single applied pavement preservation process, up to 10 years.
- Utilizes the positive aspects of both chip seal and Slurry Seal/MicroSurfacing
  - improved appearance
  - improved pavement marking visibility
  - improved surface characteristics
  - reduces exposure to loose material
  - increased binder content
  - increased durability
  - end user satisfaction
Completed Cape Seal

When done right the results can be amazing
Cold In-place Recycling with Micro Surfacing

Project Description
- Nine (9) mile Mountain Road
- Limited Access; one end was 20 miles of restricted mountain road the other end was 25 miles of mountain road with another 55 miles to an asphalt plant
- Chip seal was applied to the road in late Fall. Temperatures fell too low and dirty aggregate was used. Little to no chip retention within the first four (4) miles. Second application with dirty aggregate causes an excess of emulsion on roadway, balance of the nine miles still has poor chip retention
- Spring arrives, emulsion becomes soft and the road is closed to all traffic for three (3) months.

Solving the problem
- The owner agency partners with industry to evaluate options
  - Continue to apply sand during warm temps and roll
  - Apply micro surfacing over existing surface
  - Mill and overlay
  - Cold In-place Recycle with Micro Surfacing finish
Cold In-place Recycling with Micro-Surfacing

With High Emulsion Content the Mix Design was very important

Cold in-place required very few trucks for material delivery during construction
Cold In-place Recycling with Micro-Surfacing

- Type II Microsurfacing served as a protective surface to the CIR while providing a durable, skid-resistant finish to the road.

CIR removed all dangerous emulsion and utilized its value.
Cold In-place Recycling with Micro-Surfacing

10 lane miles Cold in Place Recycled and 18 lane miles Micro Surfaced and completed in 8 working days

Combination Treatments (General Benefits)

- Enhanced performance
  - safety
  - service life extension
  - durability
- Extend the life of roads past the typical point of a single preservation treatment
- Economical (compared to traditional treatments)
- Tailored treatments (treatment vs. distress)
- End user satisfaction (public acceptance)
Keys to Success

- Proper site selection *Right Treatment, Right Road, Right Timing*
- Good specifications (enforced)
- Proper roadway preparation (early & final)
- Well maintained equipment
- Accurate equipment calibration (Paver, Distributer & Chipper)
- Proper material application rates (emulsion/binder-Aggregate)
- Material consistency
- Contractor performance (use seasoned workforce)
- Good weather conditions
- Quality project inspection
- Agency – Industry Partnering

Additional Resources

- International Slurry Surfacing Association
  - www.slurry.org
- Asphalt Emulsion manufacturers Association
  - www.aema.org
- Asphalt Recycling & Reclaiming Association
  - www.arra.org
- National Center for Pavement Preservation
  - www.pavementpreservation.org
- National Association of County Engineers
  - www.countyengineers.com
- National Asphalt Paving Association
  - www.asphaltpavement.org
Thanks for your Participation

Please complete the evaluation to provide your feedback on this session and suggest topics for future events.

Remember to mark these upcoming events on your calendar!

Questions?

Thank You!