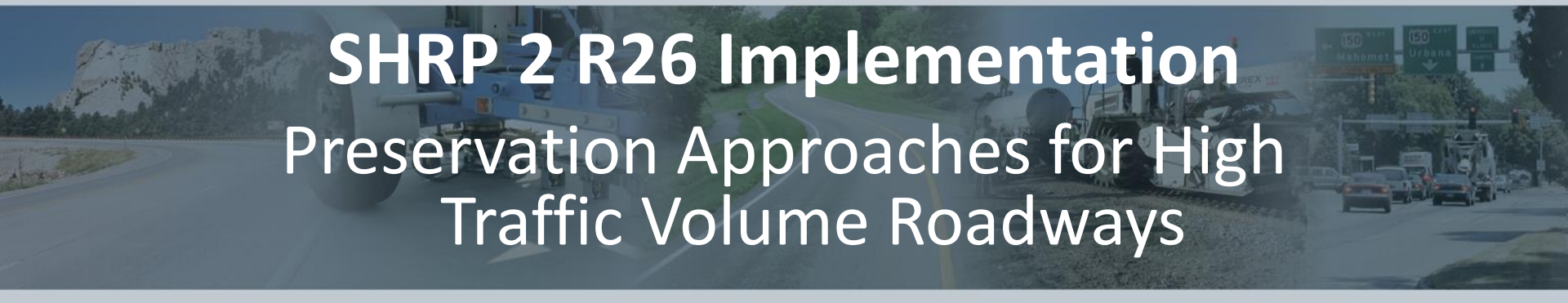

SHRP 2 R26 Implementation

Preservation Approaches for High Traffic Volume Roadways

An Update to the AASHTO Subcommittee on Maintenance Pavement Technical Working Group

July 22, 2013

Burlington, Vermont

Presented by:

David Peshkin, P.E.

applied pavement TECHNOLOGY

providing engineering solutions to improve pavement performance

Overview

- Summary of SHRP 2 R26
- Implementation Products
- Implementation Process and Status
- Support

SHRP 2 R26

- Pavement preservation for high-volume roadways
- Definitions of “high volume”
  - Rural
  - Urban
- Products
  - Decision guidance

Implementation

Brought to you by…

- AASHTO
- FHWA
- SHRP 2
- Their partners

Decision Overview, Part 1

Evaluate Current and Historical Pavement Performance Data
(from field surveys and testing and/or agency PMS database)

- Overall Condition Indicator (PCI, PSR, etc.)
- Individual Distress Types, Severities, and Extents
- Smoothness (IRI, PI, etc.)
- Surface and Subsurface Drainage Characteristics
- Safety Characteristics
  - friction/texture (FN, MPD/MTD, IFI, etc.)
  - crashes
- Pavement–Tire Noise

Review Historical Design, Construction, and Maintenance and Rehabilitation (M&R) Data

- Pavement Type and Cross-Sectional Design
- Materials and As-Built Construction
- M&R Treatments (materials, thicknesses, etc.)

Decision

Develop Preliminary Set of Feasible Preservation Treatments

Decision Overview, Part 2

Develop Preliminary Set of Feasible Preservation Treatments

↓

Assess Specific Needs and Constraints of Project

Performance Needs

- Treatment Life
  - traffic effects (functional class and/or traffic level)
  - climate/environment effects
- Risk
  - Availability of qualified contractors
  - Availability of quality materials

Construction Constraints

- Funding
- Time (of year) of construction
- Geometrics
- Work duration (facility downtime)
- Traffic accommodation

↓

Develop Final Set of Feasible Preservation Treatments

↓

Select the Preferred Preservation Treatment

- Conduct Cost-Effectiveness Analysis
  - Benefit-Cost Analysis
  - Life-Cycle Cost Analysis (LCCA)
- Evaluate Economic and Non-Economic Factors

Feasibility Matrix – Bituminous

Preservation Treatment	Window Of Opportunity		Distress Types and Severity Levels (L=Low Severity, M=Medium Severity, H=High Severity)														Surface Characteristics Issues		
			Surface Distress					Cracking Distress					Deformation Distress						
	PCI/ PCR	Age, yrs	Ravel/ Weather	Bleed/ Flush	Polish	Segre-gation	Water Bleed/ Pump*	Fatigue/ Long WP/ Slippage	Block	Trans Therm	Joint Reflect	Long/ Edge	Wear/ Stable Rutting *	Corrug/ Shove *	Bumps/ Sags	Patches	Ride Quality	Friction	Noise
			L/M/H	—	—	L/M/H	—	L/M/H	L/M/H	L/M/H	L/M/H	L/M/H	L/M/H	L/M/H	L/M/H	L/M/H	—	—	—
Crack Fill	75-90	3-6 *						×××	◉○×	○××	○××	●◉○							
Crack Seal	80-95	2-5 *						×××	◉○×	●◉○	●◉○	○××							
Slurry Seal (Type III)	70-85	5-8	◉●◉	×	◉	◉○×	◉	◉○×	●◉○	◉○×	◉○×	◉○×	○××	×××	×××	◉○×	×	◉	◉
Microsurfacing-Single	70-85	5-8	◉●◉	×	◉	●◉○	◉	◉○×	●◉○	◉○×	◉○×	◉○×	◉○×	○××	○××	◉○×	○	●	◉
Microsurfacing-Double	70-85	5-8	◉●◉	×	◉	●◉○	○	◉○×	●◉○	●◉○	●◉○	●◉○	●◉○	○○×	○○×	●◉○	◉	●	◉
Chip Seal-Single Conventional Polymer-modified	70-85 70-85	5-8 5-8	◉●◉ ○◉◉	○ ×	● ●	●◉○ ◉◉○	◉ ○	◉×× ◉○×	●◉○ ●◉◉	●◉○ ●◉◉	●◉○ ●◉◉	◉◉○ ◉○×	◉○× ◉○×	○○× ○○×	○○× ○○×	◉◉○ ◉◉○	○ ○	● ●	× ×
Chip Seal-Double Conventional Polymer-modified	70-85 70-85	5-8 5-8	○◉◉ ○○◉	× ×	◉ ◉	◉◉○ ○◉○	× ×	◉○× ●◉○	●◉◉ ●●◉	●◉◉ ●●◉	●◉◉ ●●◉	●◉◉ ●◉◉	●◉○ ●◉○	◉○× ◉○×	◉○× ◉○×	●◉◉ ●◉◉	◉ ◉	◉ ◉	○ ○
Ultra-Thin Bonded Wearing Course	65-85	5-10	◉●◉	×	●	◉◉○	○	◉○×	◉◉○	◉◉○	◉◉○	◉◉○	◉○×	◉○×	◉○×	◉◉○	◉	●	◉
Ultra-Thin HMAOL	65-85	5-10	◉●◉	×	●	◉◉○	○	◉○×	◉◉○	◉◉×	◉◉×	◉◉×	◉○×	◉○×	◉○×	◉◉○	◉	●	●
Thin HMAOL	60-80	6-12	◉●◉	○	●	◉◉○	○	●◉○	●●◉	◉●◉	◉●◉	◉◉●	◉●◉	●◉○	●◉○	●●◉	●	●	●
Cold Milling and Thin HMAOL	60-75	7-12	○◉●	○	○	◉●◉	×	◉◉○	○◉◉	◉◉●	◉◉●	○◉●	◉●◉	●◉◉	●◉○	●●◉	●	◉	○
Hot In-place Recycling Surf Recycle/HMAOL Remixing/HMAOL Repaving	70-85 60-75 60-75	5-8 7-12 7-12	○◉● ×○○ ×○○	○ ○ ○	○ ◉ ◉	◉●◉ ×○◉ ×○◉	○ × ×	◉◉○ ◉●◉ ◉●◉	●◉○ ◉●◉ ◉●◉	○◉● ◉●◉ ◉●◉	○◉● ◉●◉ ◉●◉	◉◉○ ◉●◉ ◉●◉	◉●◉ ◉●● ◉●●	◉◉○ ◉●● ◉●●	◉◉○ ○◉● ○◉●	◉◉○ ○◉● ○◉●	◉ ● ●	◉ ◉ ◉	○ ○ ○
Cold In-place Recycling and HMAOL	60-75	7-12	××○	○	○	×○◉	×	◉●◉	◉●◉	◉●◉	◉●◉	◉●◉	◉●●	◉●●	○◉●	○◉◉	●	◉	○
Profile Milling	80-90	3-6	○◉◉	◉	○	×○○	×	×××	×××	×××	×××	×××	●◉○	○××	◉◉○*	◉◉○*	◉	○	×
Ultra-Thin Whitetopping	60-80	6-12	××○	○	◉	×○◉	×	○◉◉	○◉◉	○◉◉	○◉◉	○◉●	○◉◉	○◉◉	×○○	○◉◉	◉	○	×

● Highly Recommended ◉ Generally Recommended ○ Provisionally Recommended × Not Recommended

* Poorer surface mix problem.
* Rutting primarily confined to HMA surface layer and largely continuous in extent.
* Corrugation/shoving primarily HMA surface layer mix problem and frequent in extent.
* For composite AC/PCC pavements, a more probable window of opportunity is 2-4 years for crack filling and 1-3 years for crack sealing.
* Localized application in the case of bumps.

Feasibility Matrix – PCC

Preservation Treatment	Window Of Opportunity		Distress Types and Severity Levels (L=Low Severity, M=Medium Severity, H=High Severity)														
			Surface Distress					Joint Distress		Cracking Distress		Deformation Distress		Surface Characteristics Issues		
			Polish	Map Crack/Scale (non-ASR)	D-Crack	Popouts	Water Bleed/Pump	Joint Seal Damage	Joint Spall	Corner	Long/ Trans	Faulting	Patches	Ride Quality	Friction	Noise
	PCI/ PCR	Age, yrs	—	—	L/M/H	—	—	L/M/H	L/M/H	L/M/H	L/M/H	L/M/H	L/M/H	—	—	—
Concrete Joint Resealing	75-90	5-10						○◉●	○××							
Concrete Crack Sealing	70-90	5-12								●◉○	●◉○					
Diamond Grinding	70-90	5-12	●	◉	×××	×	×	×××	×××	×××	××○*	◉●◉	◉●◉	●	◉	●
Diamond Grooving	70-90	5-12	○	×	×××	×	×	×××	×××	×××	×××	×××	×××	×	◉	●
Partial-depth Concrete Patching	65-85	6-15	×	○	×××	◉	×	×××	◉●●	×××	×○◉	×××	○◉○	×	×	×
Full-depth Concrete Patching	65-85	6-15	×	○	○◉●*	×	◉	×××	×○◉	◉●●	××○	×○◉*	○◉●	◉	×	×
Dowel Bar Retrofitting	65-85	6-15	×	×	×××	×	◉	×××	×××	×○○	×××	○◉●*	×××	×	×	×
Ultra-Thin Bonded Wearing Course	70-90	5-12	◉	●	◉○×	○	×	×××	×××	○××	○◉○	◉○×	◉●◉	●	●	◉
Thin HMA Overlay	70-90	5-12	◉	●	◉○×	○	×	×××	×××	○××	○◉○	◉○×	◉●◉	●	●	●

● Highly Recommended ◉ Generally Recommended ○ Provisionally Recommended × Not Recommended

* May be appropriate in conjunction with partial- and/or full-depth repairs to ensure smooth profile.
* Isolated incidences of D-cracking only.
* Isolated incidences of faulting only.
* Likely needed in conjunction with diamond grinding.

Secondary Selection – Bituminous

Preservation Treatment	Treatment Durability								Work Zone Duration Restrictions			Expected Performance on High Volume Facility, yrs	Relative Cost
	Rural Roads				Urban Roads				Overnight or Single-Shift	Weekend	Longer		
	High Traffic ADT > 5,000 vpd	Climatic Zone			High Traffic ADT > 10,000 vpd	Climatic Zone							
		Deep-Freeze	Moderate-Freeze	Non-Freeze		Deep-Freeze	Moderate-Freeze	Non-Freeze					
Crack Fill	●	●	●	●	●	●	●	●	●			2-3	$
Crack Seal	●	●	●	●	●	●	●	●	●			2-6	$
Slurry Seal (Type III)	○	×	◉	◉	○	×	◉	◉	●			3-5	$$
Microsurfacing-Single	◉	◉	●	◉	◉	◉	●	◉	●			3-5	$$
Microsurfacing-Double	◉	◉	●	◉	◉	◉	●	◉	●			4-6	$$ $$$
Chip Seal-Single Conventional Polymer-modified	◉	●	◉	◉	◉	◉	◉	◉	●			4-6	$$ $$$
Chip Seal-Double Conventional Polymer-modified	◉	●	◉	◉	◉	◉	◉	◉	●			6-8	$$ $$$ $$$
Ultra-Thin Bonded Wearing Course	◉	◉	●	◉	◉	◉	●	◉	●			5-8	$$$
Ultra-Thin HMAOL	○	○	◉	×	◉	◉	●	○	●			4-7	$$
Thin HMAOL	●	●	●	◉	●	●	●	◉	●			5-10	$$$
Cold Milling and Thin HMAOL	●	●	●	◉	●	●	●	●	●			6-11	$$$
Hot In-place Recycling Surf Recycle and HMAOL Remixing and HMAOL Repaving	○	○	○	×	○	○	◉	○	●			5-8 6-12 6-12	$$$ $$$ $$$
Cold In-place Recycling and HMAOL	◉	◉	◉	○	◉	◉	◉	◉	●			5-11	$$$
Profile Milling	◉	○	◉	◉	◉	○	●	◉	●			2-4	$
Ultra-Thin Whitetopping	○	○	○	○	○	○	◉	○	×	○	◉	NA	$$$$

● Highly Recommended ◉ Generally Recommended ○ Provisionally Recommended × Not Recommended

$ (lowest relative cost) ⇔ $$$$ (highest relative cost)

Secondary Selection – PCC

Preservation Treatment	Treatment Durability								Work Zone Duration Restriction:			Expected Performance on High Volume Facility, yrs	Relative Cost
	Rural Roads				Urban Roads								
	High Traffic ADT > 5,000 vpd	Climatic Zone			High Traffic ADT > 10,000 vpd	Climatic Zone			Overnight or Single-Shift	Weekend	Longer		
		Deep-Freeze	Moderate-Freeze	Non-Freeze		Deep-Freeze	Moderate-Freeze	Non-Freeze					
Concrete Joint Resealing	●	◉	●	●	●	●	●	●	●			4-7	$
Concrete Crack Sealing	●	◉	●	●	●	◉	●	●	●			4-6	$
Diamond Grinding	●	◉	●	●	●	◉	●	●	●			6-12	$$
Diamond Grooving	◉	×	◉	×	●	×	◉	◉	●			6-12	$$
Partial-depth Patching	●	●	●	●	◉	◉	●	●	●[1]	●[1]	●	5-15	$$ $$$
Full-depth Patching	●	●	●	●	●	●	●	●	●[1]	●[1]	●	10-15	$$ $$$
Dowel Bar Retrofitting	◉	●	●	●	◉	◉	◉	●	●[1]	●[1]	●	10-15	$$$
Ultra-Thin Bonded Wearing Course	○	◉	◉	×	◉	×	◉	◉	●			5-7	$$$
Thin HMA Overlay	○	×	●	×	◉	×	◉	◉	●			5-8	$$$

● Highly Recommended ◉ Generally Recommended ○ Provisionally Recommended × Not Recommended

$ (lowest relative cost) ↔ $$$$ (highest relative cost)

[1] Use of high early strength or fast-track proprietary materials make these treatments suitable options for overnight, single-shift, and weekend closures. Use of conventional PCC repair materials generally require "longer" closures.

Implementation Process

- Agencies submitted applications
- 14 selected (and funded?)

- ❑Arizona
- ❑Pennsylvania
- ❑Tennessee
- ❑Kentucky
- ❑Maine
- ❑Wisconsin
- ❑Delaware
- ❑Georgia
- ❑Rhode Island
- ❑District of Columbia
- ❑Missouri
- ❑Minnesota
- ❑Washington
- ❑Massachusetts

Nature of the Agreement

- Strictly preservation
- HVR
- Must use R26 Guidelines to select and engineer projects
- Will receive technical assistance
- Will allow documentation

Support

- Technical support
  - Project selection
  - Treatment selection
  - Tool customization
  - Construction
  - Pre-evaluation
  - Post-evaluation/monitoring

More Support

- Peer exchanges
- Workshops
- Presentations

Additional R26 Implementation

- Update to NHI 131115
- Incorporate HVR preservation content
  - Decision tools
  - Workshops

QUESTIONS?

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