R-23: Using the Existing Pavement In-Place and Achieving Long Life
Agenda

• Background
• Project Goal & Objectives
• How can you assist?
• Questions?
Pavement Design, Construction, Preservation-Related Projects

- R02. Geotech Solutions
- R05. Modular Pavement
- R21. Composite Systems
- R23. Using Existing In-place Pavement & Achieving Long Life
- R26. Preservation Approaches
- R15. Integrating Utility and Transportation Agency Priorities*
- R07. Performance Specs

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**R06. High-Speed NDT***

- R06-B: Evaluating Applications of Field Spectroscopy Devices to Fingerprint Commonly Used Construction Materials
- R06-C: Using Infrared and High Speed Ground Penetrating Radar for Uniformity measurement on New HMA Layers
- R06-D: NDT to identify Delimitations between HMA Layers
- R06-E: Real-time Smoothness Measurement During PCC Pavement Construction
- R06-F: Evaluation of Continuous Deflection Devices
Background: “The Curve”

- 75% of Life
- 40% Drop in Quality
- Terminal Serviceability
- 40% Drop in Quality
- $1.00 to Preserve / Maintain Here
- $4-$5 ?
- $11-$14 ?
- $32-$58 ?
- 12%
- R23
- 30-50 years
- T₀ - Initial Design
- T₁ - Pavement Life
Pavements in the USA

• The majority of interstate and primary system pavements in the USA were designed on the basis of a 20- to 25-year initial service life.

• **WHY? Built for Connectivity!**

• Many have performed well for much longer, even with traffic volumes and loadings far exceeding design expectations – and now need to be rebuilt.

• **R23: Rebuilt for Sustainability!**
Long-Life Pavements

• Major Goal for FHWA for Decades!
• R23 Brings previously scattered information together in one place.
• R23 Meets the 3 E’s
  – Good Engineering
  – Good Economics
  – Good Environmental Stewardship
• There are many technical requirements to properly evaluate the potential incorporation of existing materials into long-life pavement sections.
R23 Benefits

Helps state DOTs make better decisions with regard to pavement renewal projects by using existing pavement as part of the design where appropriate. Departments of transportation, drivers, highway workers, contractors, and taxpayers will benefit from:

- **Time savings** based on rapid reuse of existing materials;
- **Cost savings** from reduced need for new pavement and a shorter construction phase;
- **Safety benefits** due to reduced exposure of travelers and construction workers to potential work zone hazards;
- **A better return on investment** for the public based on a longer pavement service life; and
- **Reduced environmental footprints**, based on decreased production of pavement.
## R-23 Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Features</th>
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</thead>
<tbody>
<tr>
<td>Pavement Guidelines Tool: Interactive Decision Matrix</td>
<td>A web-based application to provide access to products and facilitate use of decision matrix</td>
</tr>
<tr>
<td>Project Assessment Manual</td>
<td>A comprehensive guide to data collection and analyses needed for decision-making.</td>
</tr>
<tr>
<td>Best Practices: Flexible and Rigid</td>
<td>A key element to long lasting pavements; although, the concept of best practices is not new.</td>
</tr>
<tr>
<td>Guide Specifications</td>
<td>Specifications are seldom provided for research focus areas.</td>
</tr>
<tr>
<td>LCCA, Emerging Technologies</td>
<td>Not new, but packaged for straightforward use and knowledge gain.</td>
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</tbody>
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# R-23 Products: How it all fits together

<table>
<thead>
<tr>
<th></th>
<th>Assessment</th>
<th>Scoping</th>
<th>Design</th>
<th>PS&amp;E</th>
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</thead>
<tbody>
<tr>
<td><strong>Pavement Guidelines Tool</strong></td>
<td></td>
<td>✓</td>
<td></td>
<td>✓ access to resources</td>
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<tr>
<td></td>
<td>Interactive decision matrix for identifying and selecting pavement renewal strategies</td>
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<tr>
<td><strong>Project Assessment Manual</strong></td>
<td></td>
<td>✓</td>
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<tr>
<td></td>
<td>Guidelines for data collection, testing, etc. required for assessment and scoping</td>
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<td><strong>Best Practices: Flexible and Rigid</strong></td>
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</table>
Click to learn about this scoping tool. The tool provides a convenient method for inputting information about an existing pavement and scoping both flexible and rigid long life renewal options for that pavement.

Click to learn about content that aids the use of this scoping tool.

Click to assess initial renewal options for existing pavement.
**Example Stripping**

1. **Project Info Description**
2. **Existing Section Current State**
3. **Proposed Section Proposed State**
4. **Section Distress Current Distress**
5. **Renewal Options Renewal**
6. **Selection Summary Design**

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**Renewal Design**

- **Existing**
  - HMA 2"
  - HMA 2"
  - HMA 3"
  - HMA 2"
  - Granular Base 6"
  - Subgrade

- **Proposed**
  - HMA 3"
  - HMA 2"
  - Granular Base 6"
  - Subgrade

- **Recommended Design**
  - Renewal Type: Flexible
  - Design Period: 40 years
  - Design ESALs: 42 million
  - Subgrade: MR 10,000 psi
  - Pre-existing Pavement or Base Modulus: 30000 psi
  - Actions: Remove and replace existing HMA because of stripping or other materials related distress then overlay with HMA. For stripping this may be limited to the striped layers and for top down cracking it will be limited to the top 2 inches of HMA.
  - Pavement Removed: 4"
  - Existing Pavement: 11"
  - Estimated Total Design Thickness: 12"
  - New Pavement: 7"
  - Added Elevation: 3"

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**Flexible Best Practices**

**Guide Specification**
Agency Participation and Contribution

- Illinois Tollway Authority (ITA)
  — Steven Gullien
- Michigan Department of Transportation (MDOT)
  — Michael Eacker
- Minnesota Department of Transportation (MnDOT)
  — Shongtao Dai
- Missouri Department of Transportation (MoDOT)
  — John Donahue, William Stone
- Texas Department of Transportation (TxDOT)
  — Magdy Mikhail
- Virginia Department of Transportation (VDOT)
  — Trenton Clark, Alex Teklu
- Washington Department of Transportation (WsDOT)
  — Jeff Uhlmeyer
Objective of the Product (R23):

• Develop reliable procedures that identify when existing pavements can be used in place and the methods necessary to incorporate the original material into the new pavement structure while achieving long life.

• SHRP 2 has defined long-life pavements as those lasting in service for 50 years or longer without needing major rehabilitation.

• This effort concentrated on understanding the state of the art of rapid renewal approaches currently used, both nationally and internationally, to construct long-lived pavement for high-volume roadways.
Draft Implementation Plan Highlights
Goal 1: Support the adoption of R23 products to lower the cost and extend the life of highway pavements. 15 to 20 highway agencies have adopted the R23 tools by December 2016.

Goal 2: Establish a framework for using R23 products to increase the long-term system performance and meet MAP-21 and existing agency performance measures by December 2016.
5 Step Implementation Process

Step 1: Communication and Outreach
Step 2: Assessment of Agency Needs
Step 3: Development of Agency Plans
Step 4: Targeted Usage
Step 5: Full Implementation
Approach May Vary with Product

• There are 5 Products:
  – Software Tool
  – Project Assessment Manual
  – Best Practices Manuals
  – Guide Specifications
  – LCCA and Emerging Technologies

• Maturity may vary by:
  – Agency
  – Industry
  – Product
How can you assist?

- **Carry the message back** to your meetings, Divisions, DOTs, colleagues and peers
- **Communication & encourage participation** in technical transfer opportunities
- **Encourage state participation** for the next round of implementation assistance
- **Volunteer** Deployment Support is always welcome
Questions?

SHRP2 R23: Using Existing Pavement in Place and Achieving Long Life


http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2174

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