Advancing Pavement Surface Evaluation to Support Engineering and Investment Decisions

American Association of State Highway & Transportation Officials (AASHTO) Expert Task Group (ETG) on Quantification of Cracking and Rutting

US Department of Transportation Federal Highway Administration
Overview

• Why?
• How?
• What’s next?
Pavement Management

“A systematic process that:
provides, analyzes, and summarizes,
pavement information,
for use in selecting and implementing
*cost-effective*
construction, rehabilitation, and maintenance”
Benefits of PMS

Define Objectives

• Organize Files?
• Help with Budgets?
• Help with M&R Recommendations?
• Documentation for Agency Administrators?

As Yogi Berra aptly said:

“If you don’t know where you’re going, you might wind up someplace else”
Pavement Management

Concept of Pavement Preservation ($P^2$)

- **Optimal Timing**
- **Preventive Trigger**
Benefits of PMS

• Potential Savings
  – Able to evaluate effectiveness of M & R over time.
  – Enables selection of cost-effective treatments.
Impact of Timing on Cost

- Standard PCI rating scale:
  - Good
  - Satisfactory
  - Fair
  - Poor
  - Very Poor
  - Serious
  - Failed

- Time scale:
  - Significant Drop in Condition
  - Small % of Pavement Life

- Rehabilitation:
  - $1 for Rehabilitation Here
  - Will Cost $4 to $5 Here
Why New Standards?
1. Expiration of AASHTO Provisional Standards PP-38 and PP-44
2. Development of newer technology
3. Increasing need for precision and accuracy
4. National infrastructure funding support
<table>
<thead>
<tr>
<th>Methodology</th>
<th>Fast</th>
<th>Safe</th>
<th>Repeatable</th>
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</thead>
<tbody>
<tr>
<td>Walking</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Windshield</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-Automated</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Automated</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</table>
How

• Task group
  – States
  – Industry
  – FHWA

• Drafted Protocols
  – Transverse profile
  – ACP cracking
Transverse Profile
Standards for Transverse Profile

PP 70 - Collecting Transverse Pavement Profile

PP 69 - Determining Pavement Deformation Parameters and Cross-Slope from Collected Transverse Profiles
Data Standards - Recording Transverse Profile

Scan Lane + 400 mm

Lane Line

Resolution within 1mm

≤10mm
Transverse Profile

±10° max
Transverse Profile Analysis

1. Calculate Cross-slope

- Average elevation of left ½ lane
- Average elevation of right ½ lane
Transverse Profile Analysis

1. Calculate Cross-slope

Roadway $C_L$

Center of Lane

Average elevation of left $\frac{1}{2}$ lane

Average elevation of right $\frac{1}{2}$ lane
2. Calculate Percent Deformation:
Transverse Profile Analysis

3. Calculate Rut Depths
Transverse Profile Analysis

3. Calculate Rut Depths

Roadway

Center of Lane

3 1 4 5
Transverse Profile Analysis

4. Calculate Rut Area
Standards for Cracking

PP 68 – Collecting Images of Pavement Surfaces for Distress Detection

PP 67 - Quantifying Cracks in Asphalt Pavement Surfaces from Collected Images Utilizing Automated Methods
Standard for recording images

- Image Characteristics
- Detection Minimums
- Reporting
Pavement images

100 m Max.

4.0 m minimum
4.25 m preferred
Standard for analyzing cracking

- Uses 5 zones
- Classifies into 3 types
  - Longitudinal
  - Transverse
  - Pattern
- Classifies by extent and severity
Pavement cracking

<table>
<thead>
<tr>
<th>Zones</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (Shoulder)</th>
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<tr>
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<td></td>
<td></td>
<td>.875m</td>
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<td>.75m</td>
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(Shoulder)
Pooled Fund Study TPF-5(299)
Improving the Quality of Pavement Surface Distress and Transverse Profile Data Collection and Analysis

1. Preparation
2. Verification
3. Precision and Bias Studies
4. Implementation
Summary:

1. AASHTO Standards have been created
   a) ACP Cracking
   b) Transverse Profile
2. Pooled Fund Study TPF-5(299) Starting
3. Presenting Methodology
to Pavement Community.
4. Seeking participation and input
to help maintain/update standards.