Overview of Performance Measures: Pavement Condition to Assess the National Highway Performance Program

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FHWA Office of Infrastructure

Road Profile Users’ Group Annual Meeting
November 2017
Contents

• Requirements (What is required?)
• Scheduling (When it is due?)
• Role of Data
**Acronyms**

- CRCP: Continuously Reinforced Concrete Pavement
- HPMS: Highway Performance Monitoring System
- IRI: International Roughness Index
- JCP: Jointed Concrete Pavement
- NHPP: National Highway Performance Program
- NHS: National Highway System
- PMS: Pavement Management System
- PSR: Present Serviceability Rating
- STP: Surface Transportation Program
- TPM: Transportation Performance Management
TPM Legislative Intent and Expectations for Pavements
**Intent of the Legislation (23 USC 150)**

- Focus on national goals
- Transparency
- Accountability
- Condition of pavements on the National Highway System (NHS)

...*State of Good Repair...*
TPM Expectations

States expected to:

• Upgrade planning processes
• Develop and use asset management plans
• Set performance targets
• Report conditions (performance)

[23 USC 119, 134, 135, and 150]
Challenges

• NHS ownership
• Information gaps
• Resource inequities
• Local vs. State vs. national priorities
• Regional economies
• Political realities
• Setting meaningful targets
National Pavement Performance Measures
Pavement TPM Regulations

• Detailed in “National Performance Management Measures for Assessing Pavement Condition,” 23 CFR 490 Subpart C
• Establishes measures for State DOTs and MPOs to use to carry out the NHPP
• Includes requirements to assess progress on achieving condition targets for NHS pavements
• Establishes minimum condition requirements for Interstate pavements
**Pavement TPM Regulations: Performance Measures (23 CFR 490.307)**

<table>
<thead>
<tr>
<th>Performance Target</th>
<th>Interstate Condition (Lane-miles)</th>
<th>Non-Interstate NHS Condition (Lane-miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Two-year</strong></td>
<td>% Good</td>
<td>% Good</td>
</tr>
<tr>
<td></td>
<td>% Poor</td>
<td>% Poor</td>
</tr>
<tr>
<td><strong>Four-year</strong></td>
<td>% Good</td>
<td>% Good</td>
</tr>
<tr>
<td></td>
<td>% Poor</td>
<td>% Poor</td>
</tr>
</tbody>
</table>
Pavement TPM Regulations: Calculating Metrics and Measures

• Highway Performance Monitoring System (HPMS) data used by FHWA to calculate good/poor metrics and measures
• Combines consideration of roughness, cracking and rutting/faulting
  o Present Serviceability Rating (PSR) for lower speed roads
• Measures aggregated by lane miles
• HPMS pavement data collection requirements revised to require more comprehensive collection of data for NHS routes

[23 CFR 490.309-313]
Data Needed to Calculate the National Pavement Measures

Inventory Data:
- NHS extent
- Section length
- Facility type
- Through lanes*
- Functional system
- Surface type
- Structure type
- Urban Code

* Directional Through lanes for dual-carriage reporting for Interstates (optional)

[23 CFR 490.309, 490.311, 490.103, and 490.101]
Data Needed to Calculate the National Pavement Measures

Condition Data:
• Roughness (IRI) (MRI)
• Rutting (asphalt pavements only)
• Cracking Percent
• Faulting (concrete pavements only)
• Can use PSR only where speed limit < 40 mph
Pavement TPM Regulations: Required Data Reporting

Interstate
- April 15
- Every Year
- Full Extent 1 Lane 1 Direction

Non-Interstate
- June 15
- 2 Years
- Full Extent 1 Lane 1 Direction

[23 CFR 490.309(b) & CFR 490.311(c)(4)]
Determining Condition for a Section

• Evaluate each of the metrics for the section to determine whether the section is good, fair or poor with respect to:
  o Asphalt: IRI, rutting, cracking %
  o JCP: IRI, faulting, cracking %
  o CRCP: IRI, cracking %

• Determine overall condition for the section based on the number of metrics that are good, fair and poor

OR

• If the posted speed limit < 40 mph:
  o Calculate from PSR: Scale = 0 to 5

[23 CFR 490.311 and 490.313]
## Pavement Condition Thresholds

<table>
<thead>
<tr>
<th></th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRI (inches/mile)</td>
<td>&lt;95</td>
<td>95-170</td>
<td>&gt;170</td>
</tr>
<tr>
<td>Rutting (inches)</td>
<td>&lt;0.20</td>
<td>0.20-0.40</td>
<td>&gt;0.40</td>
</tr>
<tr>
<td>Faulting (inches)</td>
<td>&lt;0.10</td>
<td>0.10-0.15</td>
<td>&gt;0.15</td>
</tr>
<tr>
<td>Cracking (%)</td>
<td>&lt;5</td>
<td>5-20 (asphalt)</td>
<td>&gt;20 (asphalt)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-15 (JCP)</td>
<td>&gt;15 (JCP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-10 (CRCP)</td>
<td>&gt;10 (CRCP)</td>
</tr>
<tr>
<td>PSR</td>
<td>PSR ≥ 4.0</td>
<td>2.0 ≤ PSR ≤ 4.0</td>
<td>PSR ≤ 2.0</td>
</tr>
</tbody>
</table>

[23 CFR 490.313]
## Pavement Measures Calculation

<table>
<thead>
<tr>
<th>Pavement Type</th>
<th>Overall Section Condition Rating</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
<td>percentage of lane-miles in “Good” condition</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>percentage of lane-miles in “Poor” condition</td>
</tr>
<tr>
<td></td>
<td>Fair</td>
<td>All other combinations</td>
</tr>
</tbody>
</table>

- **Asphalt and Jointed Concrete**
  - Good: All three metrics rated “Good”
  - Poor: ≥ 2 metrics rated “Poor”
  - Fair: All other combinations

- **Continuous Concrete**
  - Good: Both metrics rated “Good”
  - Poor: Both metrics rated “Poor”
  - Fair: All other combinations

[23 CFR 490.313]
State Pavement TPM Regulations: Interstate Minimum Condition and Penalty

- A minimum pavement condition for the Interstate System is no more than 5% in Poor condition
- FHWA will assess this minimum condition annually, using data in the HPMS as of June 15
- If the minimum condition threshold is not met, the penalty is that the State must obligate a specified percentage of its NHPP and Surface Transportation Program (STP) funds to address Interstate conditions
- 1st assessment will occur in 2019

[23 CFR 490.315 & 23 CFR 490.317]
Calculating Pavement Performance Targets
Pavement Performance Data: Supporting Target Setting

- Available data: What data are available to support predictions of performance?
- Pavement performance trends: What drives anticipated conditions?
- Variability in the data
- Analysis of alternate strategies, costs and timing
- Tolerance for risk
Recommended Analysis Components

- Determine what drives pavement performance
- Conduct life-cycle planning analysis including risk tolerance for alternate strategies
- Identify program priorities given constraints, historical performance, system demands and tradeoffs with other assets
Target-Setting Tools

• Every State is required to have a PMS with certain basic analytical functionality
• MPOs and other agencies may need to leverage State PMS resources to support their analyses
• In some cases, the necessary functionality may be provided by a mix of different systems and analytical tools

[23 CFR 515.17]
Pavement Performance Reporting
State Pavement Performance Reporting: What’s Required

State Reports:

• **Baseline** Report by Oct. 1 of the first performance year
• **Mid Period** Progress Report by Oct. 1 of the third performance year
• **Full Period** Progress Report by Oct. 1 of the fifth year following the performance period

[23 CFR 490.107(b)(1)]
**Why Report on Performance?**

- Evaluate the impact of Federal-aid funds on the national goal set for infrastructure condition
- Report to the public on pavement conditions, significant progress and target achievement in each State
- Report to Congress on the condition and performance of the Federal-aid highway system

...Tell the story...
## State Performance Progress Report Contents

<table>
<thead>
<tr>
<th>Contents</th>
<th>Baseline</th>
<th>Mid Period</th>
<th>Full Period</th>
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<tbody>
<tr>
<td>2-year targets</td>
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<tr>
<td>4-year targets</td>
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<td>Basis for targets</td>
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<tr>
<td>Baseline conditions</td>
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<td>Progress discussion</td>
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<td>Adjusted four-year targets</td>
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<td>NHPP target achievement discussion</td>
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Contacts

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