Transportation Performance Management

MAP 21: Rulemaking and Asset Condition

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

Virginia Asphalt Association Conference
Richmond, VA
October 2, 2017
Outline

• TPM Legislative and Regulatory Requirements for Pavements
• National Pavement Performance Measures
• Pavement Target-Setting Process
• Resources
TPM Legislative and Regulatory Requirements for Pavements
Transportation Performance Management (TPM)

A strategic approach that uses system information to make investment and policy decisions to achieve transportation system performance goals.
TPM Elements

1. National Goals
2. Measures
3. Targets
4. Plans
5. Reports
6. Accountability and Transparency
National Goals

- Safety
- Infrastructure Condition
- Congestion Reduction
- System Reliability
- Freight Movement and Economic Vitality
- Environmental Sustainability
- Reduced Project Delivery Delays
Applying the Framework

National goals defined in MAP-21 & FAST Acts

National measures established by USDOT

State and MPO targets developed to track measures in each performance area

States and Metropolitan Planning Organizations (MPOs) report targets and their progress toward them

FHWA assesses progress
## Measures

<table>
<thead>
<tr>
<th>Key Terms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>Expression based on a metric that is used to establish targets and to assess progress toward achieving the established targets</td>
</tr>
<tr>
<td><strong>Example for Pavements:</strong></td>
<td>% of lane-miles of pavements in “Good” condition</td>
</tr>
<tr>
<td>Metric</td>
<td>Quantifiable indicator of performance or condition</td>
</tr>
<tr>
<td><strong>Example for Pavements:</strong></td>
<td>Is the pavement doing what it is supposed to do (IRI) and is it in need of major investment (Distresses)</td>
</tr>
<tr>
<td>Target</td>
<td>Quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within the time period.</td>
</tr>
<tr>
<td><strong>Example for Pavements:</strong></td>
<td>No more than X% of Interstate pavement in Poor Condition by 2020</td>
</tr>
</tbody>
</table>
**Targets**

- Once set, targets specify a level of performance that the agency expects to achieve.
- To set targets, agencies follow a structured process to:
  - Identify and prioritize needs.
  - Allocate resources to best meet those needs.
  - Select projects that best achieve desired outcomes.
Targets – Virginia DOT (VDOT) Example

Garrett W. Moore, P.E.
Deputy Commissioner Chief Engineer

Kevin Gregg
State Maintenance Engineer

Kendal R. Walius, P.E.
State Structure and Bridge Engineer

Condition

Pavement Condition
Target 82%

Bridge Condition
Target 92% Non-Red (Non-SD)
R: 1237
Y: 4967
G: 14899

Ride Quality
Target 85%

Current: 82%  Last Year: 83%
Green and Yellow Percent: 94.1%
Current: 88%  Last Year: 88%
Accountability and Transparency

States shall set Targets for:

- National Highway Performance Program (NHPP)
- Highway Safety Improvement Program (HSIP)
- Congestion Mitigation and Air Quality Program (CMAQ)
- National Highway Freight Program (NHFP)

Minimum standards are established for:

- Interstate pavements
- National Highway System (NHS) bridges
National Pavement Performance Measures
## Pavement TPM Regulations: Performance Measures

<table>
<thead>
<tr>
<th>Performance Target</th>
<th>Interstate Condition</th>
<th>Non-Interstate NHS Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-year</td>
<td>% Good</td>
<td>% Good</td>
</tr>
<tr>
<td></td>
<td>% Poor</td>
<td>% Poor</td>
</tr>
<tr>
<td>Four-year</td>
<td>% Good</td>
<td>% Good</td>
</tr>
<tr>
<td></td>
<td>% Poor</td>
<td>% Poor</td>
</tr>
</tbody>
</table>
Supporting Systems: Pavement Management System (PMS)

- Collect, process, store and update pavement inventory and conditions
- Forecast pavement deterioration
- Determine benefit-cost over the life cycle of pavements to determine alternative strategies
- Identify short- and long-term budget needs
- Determine strategies for project selection that maximize overall program benefits
- Recommend pavement programs and schedules within policy and budget constraints
Supporting Data Systems: HPMS

- Official Federal source of data on the extent, condition, performance, use and operating characteristics of the nation’s highways
- Populated by States using each State’s linear referencing system
- Data requirements in the HPMS Field Manual, December 2016 version
Data Needed for Calculating the National Pavement Measures

Condition Data:
• Roughness (IRI)
• Rutting (asphalt pavements only)
• Cracking
• Faulting (concrete pavements only)
• Can use Present Serviceability Rating (PSR) only where speed limit < 40 mph
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
# Pavement Condition Thresholds

<table>
<thead>
<tr>
<th></th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IRI (inches/mile)</strong></td>
<td>&lt;95</td>
<td>95-170</td>
<td>&gt;170</td>
</tr>
<tr>
<td><strong>Rutting (inches)</strong></td>
<td>&lt;0.20</td>
<td>0.20-0.40</td>
<td>&gt;0.40</td>
</tr>
<tr>
<td><strong>Faulting (inches)</strong></td>
<td>&lt;0.10</td>
<td>0.10-0.15</td>
<td>&gt;0.15</td>
</tr>
<tr>
<td><strong>Cracking (%)</strong></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>
</tbody>
</table>
## Calculation of Pavement Measures

<table>
<thead>
<tr>
<th>Overall Section Condition Rating</th>
<th>Pavement Type</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Asphalt and Jointed Concrete</td>
<td>3 metric ratings (IRI, cracking and rutting/faulting)</td>
</tr>
<tr>
<td>Good</td>
<td>Continuous Concrete</td>
<td>2 metric ratings (IRI and cracking)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>All three metrics rated “Good”</td>
<td>Both metrics rated “Good”</td>
</tr>
<tr>
<td>Fair</td>
<td>≥ 2 metrics rated “Poor”</td>
<td>Both metrics rated “Poor”</td>
</tr>
<tr>
<td></td>
<td>All other combinations</td>
<td>All other combinations</td>
</tr>
</tbody>
</table>
## Calculation of Pavement Measures

<table>
<thead>
<tr>
<th>Overall Section Condition Rating</th>
<th>Pavements with Speed Limit less than 40 MPH</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>PSR ≥ 4.0</td>
<td>% of lane-miles in “Good” condition</td>
</tr>
<tr>
<td>Poor</td>
<td>PSR ≤ 2.0</td>
<td>% of lane-miles in “Poor” condition</td>
</tr>
<tr>
<td>Fair</td>
<td>2.0 &lt; PSR &lt; 4.0</td>
<td></td>
</tr>
</tbody>
</table>
Pavement Metric Rating Example: Asphalt Surfaces, Interstate

IRI = 180 in/mile
G: <95; F: 95-170; P: >170

Cracking = 7.0%
G: <5%; F: 5-20%; P: >20%

Rutting = 0.3 in
G: <0.2”; F: 0.2”-0.4”; P: >0.4”

1 Poor rating and 2 Fair ratings

Overall Section Rating = Fair
Pavement Performance

Depends on:
- Complete data
- Quality data
- Timely HPMS reporting
Data Quality Management Plan Requirements

- Data collection equipment calibration and certification
- Certification process for persons performing manual data collection
- Data quality control measures to be conducted before data collection begins and periodically during the data collection program
- Data sampling, review and checking processes
- Error resolution procedures and data acceptance criteria
Data Quality Management Plan

- Addresses the quality of all data collected to report the pavement condition metrics
- Applies to manual and automated data acquisition methods
- States must submit for FHWA approval by May 20, 2018
- Must also submit any significant changes to the plan proposed following its initial submittal
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.
Example: Colorado DOT Performance Targets and Results

Performance Area: Road Quality

Pavement
CDOT obtains a better return on taxpayer dollars when it regularly and systematically maintains roadway surfaces rather than fully reconstructing the road after it has deteriorated. Learn More

Percent of Pavement Drivability
- 20%
- 80%

Long Range Goal
80%

Actual for 2016
80%
Resources
Pavement Performance-Related Requirements

• Pavement TPM regulations (23 CFR 490)
• National Highway Performance Program (NHPP) (23 USC 119)
• Asset Management Plan Rule (23 CFR 515)
• Relationship of TPM to performance-based planning and programming (PBPP) (23 CFR 450 and 49 CFR 613)
• Highway Performance Management System (HPMS) Field Manual (23 CFR 490)
**FHWA Resources**

- **TPM Internet Site:**
  - [https://www.fhwa.dot.gov/tpm/](https://www.fhwa.dot.gov/tpm/)

- **PM2 Rule**
Contacts

Luis Rodriguez
FHWA Resource Center
Tel: 470-346-8850
Email: luis.rodriguez@dot.gov

Thomas Van
FHWA Office of Infrastructure
Tel: 202-366-1341
Email: thomas.van@dot.gov

Max Grogg
FHWA Office of Infrastructure
Tel: 515-233-7306
Email: max.grogg@dot.gov
Questions?