NHS Performance Metrics: MAP-21 Transportation Performance Management
Assessing Pavement and Bridge Condition for the National Highway Performance Program

May 20, 2015
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Transportation Performance Management

**National Highway System (NHS)**

- Expanded by MAP-21
  - Interstate System and Other Principle Arterials
  - Intermodal Connectors
- Facts
  - 223,000 miles
  - 771,000 lane-miles
  - 88% State owned miles
  - 143,165 bridges
  - 94% State owned bridges
  - 5.4% US mileage
  - 58.0% total travel
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**NHS Routes in Virginia**

- Approximately 4,700 miles NHS  
  (Total miles not yet approved by FHWA)
- Added 900 - 1,000 from Map-21  
  (Number not yet approved by FHWA)
- Large % Locally Maintained
- VDOT will provide maps of NHS routes to localities
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2014 NHS Improvement Types by Federal Funding

- Pavement Improvement, 29.7%
- Pavement Widening, 23.8%
- New Construction, 8.2%
- Bridge Improvements, 7.3%
- Bridge Replacement, 12.9%
- New Bridge Construction, 3.1%
- Safety/traffic Management, 5.0%
- Transportation Enhancements, 4.0%
- Other, 6.0%
Importance of Preservation and Improvement of the NHS

• Preserving and improving the NHS’ pavements and bridges through a risk based asset management approach keeps America’s infrastructure safer, increases mobility, improves the U.S. economy and improves U.S. competitiveness in world trade

• The implementation of MAP-21 performance measures will focus federal transportation investments on the NHS leading to improved bridge and pavement conditions
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National Highway Performance Program Measure Areas

• Proposed in this Rulemaking
  • Pavement Condition
    • Interstate
    • Non-Interstate National Highway System
  • Bridge Condition
    • National Highway System

• Proposed in next Performance Measure Rulemaking
  • System Performance
    • Interstate
    • Non-Interstate National Highway System
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Why is this important to you?

- Map 21 requires performance measures for the entire NHS system
- FHWA will make no distinction between Local and State maintained
- VDOT will be responsible for reporting to the FHWA
- All States will be reporting using the same format
- If targets are not met, the FHWA can redirect federal funding to areas they determine as necessary
- There are additional penalties
- Nationwide reporting could be used to rank performance of individual states
- VDOT is proposing to modify the Weldon Cooper Survey to account for the costs associated with NHS routes
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National Performance Management Measures for Assessing Pavement Condition
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Pavement Condition Performance Measures – Selection Process

Appropriateness

Sources of Input

Readiness

Selection of 4 Pavement Condition Measures

Infrastructure Condition PM NPRM: Part 1

Subpart C (490.300s) 21
### National Performance Management Measures for Assessing Pavement Condition (490.307)

<table>
<thead>
<tr>
<th>Pavement Condition Measures</th>
<th>Interstate System</th>
<th>Non-Interstate NHS System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of pavements in “Good” condition</td>
<td>Percentage of pavements in “Good” condition</td>
<td></td>
</tr>
<tr>
<td>Percentage of pavements in “Poor” condition</td>
<td>Percentage of pavements in “Poor” condition</td>
<td></td>
</tr>
</tbody>
</table>

Transportation Performance Management
Transportation Performance Management

Relationship between Data Requirements, Pavement Metrics, and Performance Measures

**Data Requirements**
- Type of data to be collected
- Methods of data collection
- Extent and frequency of collection

**Pavement Metrics**
- Calculated using collected data
- Based on sections of highway pavement
- Reported in the HPMS

**Pavement Measures**
- Calculated using metrics reported in the HPMS
- Used by States to report the condition of Interstate System and non-Interstate NHS

Infrastruture Condition PM NPRM: Part 1
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Highway Performance Management System (HPMS)

- National Program that includes inventory information for all of the Nation’s public road mileage
- Federal government source data on the extent, condition, performance, use, and operating characteristics of the nation’s highways
- States’ Governor certifies to FHWA on an annual basis
- Data includes: length, lane-miles, and vehicle miles traveled
- Used in the apportionment of Federal-aid highway funds
- Covers the NHS in greater detail
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**HPMS Data Collection and Reporting Requirements (490.309)**

**Non-Interstate NHS Pavements**

<table>
<thead>
<tr>
<th>International Roughness Index</th>
<th>Now</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due Date</td>
<td>June 15</td>
<td>June 15</td>
</tr>
<tr>
<td>Frequency</td>
<td>1 year</td>
<td>2 years*</td>
</tr>
<tr>
<td>Coverage</td>
<td>Full Extent 1 Lane 1 Direction</td>
<td>Full Extent 1 Lane 1 Direction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cracking, Rutting, Faulting</th>
<th>Now</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due Date</td>
<td>June 15</td>
<td>June 15</td>
</tr>
<tr>
<td>Frequency</td>
<td>2 years</td>
<td>2 years</td>
</tr>
<tr>
<td>Coverage</td>
<td>Samples 1 Lane 1 Direction</td>
<td>Full Extent* 1 Lane 1 Direction</td>
</tr>
</tbody>
</table>

*Beginning 2018/2019

Infrastructure Condition PM NPRM: Part 1

Subpart C (490.300s) 25
### 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></td>
<td></td>
<td>95-220*</td>
<td>&gt;220*</td>
</tr>
<tr>
<td><strong>Cracking (%)</strong></td>
<td>&lt;5</td>
<td>5-10</td>
<td>&gt;10</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;0.05</td>
<td>0.05-0.15</td>
<td>&gt;0.15</td>
</tr>
</tbody>
</table>

*Population >1M*
### Calculation of Pavement Measures (490.313)

<table>
<thead>
<tr>
<th>Overall Section Condition Rating</th>
<th>3 metric ratings (IRI, cracking and rutting/faulting)</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>All three metrics rated “Good”</td>
<td>percentage of lane-miles in “Good” condition</td>
</tr>
<tr>
<td>Poor</td>
<td>≥ 2 metrics rated “Poor”</td>
<td>percentage of lane-miles in “Poor” condition</td>
</tr>
</tbody>
</table>
Minimum Condition and Penalties for Pavements (490.315 and 490.317)

Minimum Condition Level: Percentage of lane-miles of Interstate System in Poor condition would not exceed 5.0%

FHWA is committed to reassessing the minimum condition level after completion of the first full performance period

Penalty: If minimum not met for two consecutive years, State must obligate NHPP & transfer STP funds
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National Performance Management Measures for Assessing Bridge Condition
**NHS Bridge Condition Performance Measures (490.407)**

**Bridge Condition Performance Measures**

- Percentage of NHS Bridges Classified as in “Good” Condition
- Percentage of NHS Bridges Classified as in “Poor” Condition
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Data Sources and Components of a Bridge

- Deck
- Superstructure
- Substructure

Bridge NBI Items:
- Item 58 - Deck
- Item 59 - Superstructure
- Item 60 - Substructure

Culvert NBI Item:
- Item 62 - Culverts

Infrastructure Condition PM NPRM: Part 2

Subpart D (490.400s) 32
## NBI Bridge Condition Rating Thresholds for NHS Bridges

<table>
<thead>
<tr>
<th>NBI Rating Scale</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bridge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deck</td>
<td>≥7</td>
<td>5 or 6</td>
<td>≤4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Item 58)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superstructure</td>
<td>≥7</td>
<td>5 or 6</td>
<td>≤4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Item 59)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substructure</td>
<td>≥7</td>
<td>5 or 6</td>
<td>≤4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Item 60)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert</td>
<td>≥7</td>
<td>5 or 6</td>
<td>≤4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Item 62)</td>
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<td></td>
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</tr>
</tbody>
</table>

*Note: Thresholds are based on the NBI Rating Scale scores.*

*Source: U.S. Department of Transportation*
### Calculating NHS Bridge Condition Performance Measures (490.409)

<table>
<thead>
<tr>
<th>Overall Bridge Condition Rating</th>
<th>Structure Type</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bridges</td>
<td>percentage of deck area classified as in “Good”</td>
</tr>
<tr>
<td>Good</td>
<td>3 metric classification (58-Deck, 59-Superstructure, 60-Substructure)</td>
<td>Metric rated “Good”</td>
</tr>
<tr>
<td></td>
<td>Culverts</td>
<td>percentage of deck area classified as in “Poor”</td>
</tr>
<tr>
<td></td>
<td>1 metric classification (62-Culverts)</td>
<td>Metric rated “Poor”</td>
</tr>
<tr>
<td>Poor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>Minimum rated metric “Fair”</td>
<td>Metric rated “Fair”</td>
</tr>
</tbody>
</table>
Minimum Condition and Penalty for Structurally Deficient Bridges (490.411 and 490.413)

Minimum condition level: $\leq 10\%$ of total deck area of NHS bridges classified as Structurally Deficient

Calculation:
\[
100.0 \times \frac{\text{Total Deck Area of NHS Bridges Classified as Structurally Deficient}}{\text{Total Deck Area of NHS Bridges in a State}}
\]

Penalty: If for 3 consecutive years the minimum condition level is not met, State must set aside and obligate NHPP funds for eligible projects on bridges on the NHS
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Target
Establishment/Reporting/NHPP
Significant Progress
**Establishment of Performance Targets (490.105)**

<table>
<thead>
<tr>
<th><strong>Who</strong></th>
<th>All States and MPOs establish targets</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What</strong></td>
<td>Targets required for every measure</td>
</tr>
<tr>
<td><strong>Where</strong></td>
<td>Entire network or area regardless of ownership</td>
</tr>
<tr>
<td><strong>When</strong></td>
<td>4 year performance period to align with biennial reports</td>
</tr>
</tbody>
</table>

**Target Reporting:** Report 2-year and 4-year targets
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Establishment of Performance Targets

State Targets
- Establish 2- & 4-year targets
- Target adjustment of 4-year target allowed at the midpoint of target period
- Only Statewide targets are required
- Optional additional urbanized/non-urbanized targets

MPO Targets
- Establish 4-year targets by either committing to support the State target or setting a quantifiable target*
- If State adjusts target, any MPO adjustments must occur within 180 days
- If MPO changes target, must be agreed upon by State and documented in Metropolitan Planning Agreement

*When applicable
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Performance Periods

Calendar Year

1st Performance Period

2nd Performance Period
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State Reporting on Performance Targets (490.107)

Baseline Performance Period Report
- 2-year and 4-year targets
- Baseline condition/performance
- Urbanized area boundaries and population data
- NHS limits
- Relationship with other performance expectations

Mid Performance Period Progress Report
- 2-year condition/performance
- Investment strategy effectiveness
- Progress discussion
- Target adjustment (optional)*
- Extenuating circumstances*
- Target achievement discussion*

Full Performance Period Progress Report
- Same content as Mid Performance Period Progress Report, but reporting on 4-year targets

*Only include when applicable

Infrastructure Condition PM NPRM: Part 3

Subpart A (490.100s) 42
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**Targets and Target Reporting**

- **Condition / Performance**
- **Performance Period**
- **Baseline Performance Period Report (due Oct Year 1)**
- **Baseline Condition / Performance**
- **2-Year Target**
- **4-Year Target**

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Mid Performance Period Progress Reporting

- Baseline Condition / Performance
- Actual Midpoint Condition / Performance
- Mid Performance Period Progress Report (due Oct Year 3)
- Adjusted 4-Year Target
- 4-Year Target
- Mid Period Significant Progress Determination for NHPP Targets

Infrastructure Condition PM NPRM: Part 3

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Full Performance Period Progress Reporting

- Performance Period
- Baseline Condition / Performance
- Actual Midpoint Condition / Performance
- 2-Year Target
- Actual Period-end Condition / Performance
- Adjusted 4-Year Target
- Full Performance Period Progress Report (due Oct Year 5)
- Period-end Significant Progress Determination for NHPP Targets

Infrastructure Condition PM NPRM: Part 3

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Assessing Significant Progress Towards Achieving the Performance Targets for the NHPP (490.109)

<table>
<thead>
<tr>
<th>Who</th>
<th>FHWA determines if a State has made significant progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>What</td>
<td>Make determination for each NHPP target</td>
</tr>
<tr>
<td>When</td>
<td>Assess significant progress every 2 years*</td>
</tr>
<tr>
<td>* This will be phased in for Interstate pavement condition, which will not be considered in the first mid-year assessment</td>
<td></td>
</tr>
</tbody>
</table>

Consequence: If a State has not made significant progress in two consecutive determinations, then the State will document in its next Biennial Performance Report actions the State will undertake to achieve the target related to the measure in which significant progress was not achieved.
Determining Significant Progress Toward the Achievement of NHPP Performance Targets

- Any improvement from Baseline is significant
- Must be equal or better than Target

- Actual meet target?
- If not, actual better than baseline?
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MAP-21 Putting Performance into Action

The U.S. Department of Transportation (USDOT) is implementing the new MAP-21 performance requirements through ten rulemakings released in several phases. (pdf, 0.3 mb)

TPM and MAP-21
- What is TPM?
- National Goals
- MAP-21 Performance Requirements Summary
- MAP-21 Putting Performance into Action (pdf, 1.3 mb)
- Implementation Schedule
- Notices of Proposed Rulemaking

Engagement
- Rulemaking Stakeholder Engagement
- Readiness Stakeholder Engagement
- Reporting
- TPM Community of Practice

Resources
- Apply for P2P Technical Assistance
- Noteworthy Practices
- Presentations and Webinars
- Publications
- Tools
- TPM Digest April 2014

Email Notification
- Subscribe to email updates

News and Events
- 2014 Rail Conference June 15 - 18, 2014
- Data Palooza Session Recordings (May 9, 2013)
- View all TPM Events
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Questions and Answers
NHS Performance Metrics:
MAP-21 Transportation Performance Management
Assessing Pavement and Bridge Condition for the National Highway Performance Program

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