TRANSPORTATION PERFORMANCE MANAGEMENT
Asset Management and Pavement Performance Measures...The 30,000’ 250 mile view.
Transportation Performance Management
Transportation Performance Management (TPM)

A strategic approach that uses system information to make investment and policy decisions to achieve transportation system performance goals.
Scott’s English Translation...

How can we best utilize the Fed-Aid taxpayer’s $$ to make smart transportation decisions that provide mobility and safety while protecting our most important assets.
So, how exactly did we get here...?
MAP-21 And the FAST ACT Legislation...

MAP-21

• Signed into law on July 6, 2012
• $105 Billion for Fiscal Years 2013 and 2014

FAST ACT

• Signed into law on December 4, 2015
• $305 Billion for Fiscal Years 2016 through 2020
MAP 21 And the FAST ACT Legislation...

The Moving Ahead for Progress in the 21st Century Act (MAP-21), enacted in 2012, included provisions to make the Federal surface transportation more streamlined, performance-based, and multimodal, and to address challenges facing the U.S. transportation system, including improving safety, maintaining infrastructure condition, reducing traffic congestion, improving efficiency of the system and freight movement, protecting the environment, and reducing delays in project delivery. The FAST Act builds on the changes made by MAP-21.
WE HAVE LEGISLATION...NOW WHAT??

FHWA TPM Rulemaking and Final Rules

Your voice heard...somewhat
**FHWA TPM Rulemaking: Status**

<table>
<thead>
<tr>
<th>TPM Related Rules</th>
<th>NPRM</th>
<th>Final Rule Effective Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway Safety Improvement Program</td>
<td>March 28, 2014</td>
<td>April 14, 2016</td>
</tr>
<tr>
<td>Statewide and Non-Metropolitan Planning; Metropolitan Planning</td>
<td>June 2, 2014</td>
<td>June 27, 2016</td>
</tr>
<tr>
<td>Pavement and Bridge Condition Measures</td>
<td>January 5, 2015</td>
<td>May 20, 2017</td>
</tr>
<tr>
<td>Performance of the NHS, Freight, and CMAQ Measures</td>
<td>April 22, 2016</td>
<td>May 20, 2017</td>
</tr>
</tbody>
</table>

* Except for portions of the rule related to the percent change in CO2 emissions from 2017 (GHG measure). Those portions are delayed and FHWA will be publishing an NPRM in the Federal Register pertaining to this measure.
**TPM: Putting the Pieces Together**

- National Goals
- Measures
- Targets
- Plans
- Reports
- Accountability and Transparency
Transportation Asset Management Plan (TAMP)
Assets... 😐
Transportation Assets...
Transportation Asset Mgmt. Plan (TAMP)

A plan for managing the asset base over a period of time in order to deliver the agreed Levels of Service and Performance Targets in the most cost-effective way.
What is in the TAMP?

At a minimum...

• A summary listing of the pavement and bridge assets on the National Highway System in the state (including the **condition** of those assets)
• Asset management objectives and measures
• Performance gap identification
• Lifecycle cost and risk management analysis
• A financial plan and,
• Investment Strategies
Asset Management

• Not later than April 30, 2018, the State DOT must submit to FHWA a State-approved initial TAMP that includes descriptions of the State DOT’s TAMP development processes with a request for certification of those asset management processes (this is the deadline under 23 CFR 515.11(a)).
Target Establishment and Reporting
§ 490.105 Establishing Targets – State DOTs

• Establish 2-year and 4-year targets for each performance period
  o First set of targets within 1 year of the effective date of the final rule: May 20, 2018
  o Targets must be reported to FHWA by October 1, 2018.
• Adjustment of 4-year target allowed at the mid-point of performance period
• States may set targets that are worse than the baseline (not more than 5%)
§ 490.105 Establishing Targets - MPOs

- Establish 4-year targets by supporting the State DOT target or establishing a quantifiable target
  - Establish targets within 180 days relevant State DOT(s) establish targets
  - A multistate planning area - may choose different target establishment options for the portion of the planning area within each State
§ 490.105 & 490.107 Timeline for Performance Periods and State DOT Biennial Performance Reporting

1st Performance Period

- Baseline Performance Period Report (due Oct 1, 2018)
- Mid Performance Period Progress Report (due Oct 1, 2020)

2nd Performance Period

- Full Performance Period Progress Report (due Oct 1, 2022)
- Baseline Performance Period Report (due Oct 1, 2022)
- Mid Performance Period Progress Report (due Oct 1, 2024)
- Full Performance Period Progress Report (due Oct 1, 2026)
National Performance Management
Measures for Assessing Pavement Condition
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
§ 490.307 Performance Measures

<table>
<thead>
<tr>
<th>Pavement Condition Measures</th>
<th>Interstate System</th>
<th>Non-Interstate NHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of pavements of the Interstate System in <strong>Good</strong> condition</td>
<td>Percentage of pavements of the non-Interstate NHS in <strong>Good</strong> condition</td>
<td></td>
</tr>
<tr>
<td>Percentage of pavements of the Interstate System in <strong>Poor</strong> condition</td>
<td>Percentage of pavements of the non-Interstate NHS in <strong>Poor</strong> condition</td>
<td></td>
</tr>
</tbody>
</table>
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
### § 490.311 Metric Thresholds in Final Rule

<table>
<thead>
<tr>
<th></th>
<th>Rating</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IRI (inches/mile)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;95</td>
<td>95-170</td>
<td>&gt;170</td>
<td></td>
</tr>
<tr>
<td><em><em>PSR</em> (0.0-5.0 value)</em>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥4.0</td>
<td>2.0-4.0</td>
<td>≤2.0</td>
<td></td>
</tr>
<tr>
<td><strong>Cracking Percent (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rutting (inches)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;0.20</td>
<td>0.20-0.40</td>
<td>&gt;0.40</td>
<td></td>
</tr>
<tr>
<td><strong>Faulting (inches)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;0.10</td>
<td>0.10-0.15</td>
<td>&gt;0.15</td>
<td></td>
</tr>
</tbody>
</table>

*PSR may be used only on routes with posted speed limit < 40mph.
<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>Continuous Concrete</td>
</tr>
<tr>
<td>Good</td>
<td>3 metric ratings (IRI, cracking and rutting/faulting)</td>
<td>2 metric ratings (IRI and cracking)</td>
</tr>
<tr>
<td></td>
<td>All three metrics rated “Good”</td>
<td>Both metrics rated “Good”</td>
</tr>
<tr>
<td>Poor</td>
<td>≥ 2 metrics rated “Poor”</td>
<td>Both metrics rated “Poor”</td>
</tr>
<tr>
<td>Fair</td>
<td>All other combinations</td>
<td>All other combinations</td>
</tr>
</tbody>
</table>

- Measures:
  - Percentage of lane-miles in “Good” condition
  - Percentage of lane-miles in “Poor” condition
Pavement Metric Rating Example: Asphalt Surfaces, Interstate

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

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

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

1 Poor rating and 2 Fair ratings

Overall Section Rating = Fair
Pavement TPM Regulations:
Required Data Reporting
Mainline Only

Roughness, Cracking, Rutting, Faulting

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

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

**Due Date**
- June 15
- 2 Years

**Frequency**
- Every Year
- 2 Years

**Coverage**
- Full Extent 1 Lane 1 Direction
- Full Extent 1 Lane 1 Direction
§ 490.309 Reporting Requirements

Data to HPMS:
- Interstate – Annually on April 15 (starts 2019)
- Non – Interstate NHS – Biennial on June 15 (starts 2022)

Reports to TPM
- Biennial October 1 (Starts 2018)

§ 490.315 & 490.317

Minimum Pavement Condition

Interstate Only – No more than 5% of lane-miles Poor
Penalty – Move Funds to Interstate Program
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...
Helpful Links...

https://www fhwa dot gov/tpm/

https://www fhwa dot gov/tpm/links_fhwa cfm

https://www fhwa dot gov/tpm/about/statutes cfm#reports
Questions are guaranteed in life; Answers aren't.

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FHWA-Louisiana Division
Scott.Nelson@dot.gov
National Performance Management Measures:

Bridge Condition to Assess the National Highway Performance Program
Assessing Bridge Condition

Background

MAP-21 legislation as incorporated in 23 U.S.C. 150:

The US Secretary of Transportation shall establish performance measures for carrying out the National Highway Performance Program (NHPP) and for State DOTs and MPOs to use in assessing the condition of bridges carrying the NHS.
§ 490.105 Establishing Targets

State Targets

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

**MPOs Target**

- Establish 4-year targets by either committing to support the State target or setting a quantifiable target.
- Action within 180 days of State DOT target setting.
- If State DOT adjusts target, any MPO adjustments must occur within 180 days.
- If MPO changes quantifiable target, must be agreed upon by State and documented in Metropolitan Planning Agreement.
§ 490.107 Target Reporting

- **Baseline Report:**
  - Baseline condition/performance
  - 2- and 4-year targets

- **Mid Period Report:**
  - 2-year condition/performance
  - Adjusted 4-year targets, etc.

- **Full Period Report:**
  - 4-year condition/performance;
  - Discussion of plans and programs
Performance Periods

§ 490.105 & 490.107 Timeline for Performance Periods and State DOT Biennial Performance Reporting

1st Performance Period

Baseline Performance Period Report (due 10/1/2018)
Mid Performance Period Progress Report (due 10/1/2020)

2nd Performance Period

Full Performance Period Progress Report (due 10/1/2022)
Baseline Performance Period Report (due 10/1/2022)
Mid Performance Period Progress Report (due 10/1/2024)
Full Performance Period Progress Report (due 10/1/2026)

2-Year Performance
4-Year Performance
Assessing Bridge Condition
Assessing Bridge Condition

Background

DATA – From National Bridge Inventory (NBI)
- Applies to bridges carrying the NHS
  - under the jurisdiction of and maintained by a public authority and open to public travel
  - includes bridges connecting on- and off-ramps
  - Includes bridges crossing State borders
Classifications and Measures

Three classifications by deck area:
- % in **Good** condition
- % in **Fair** condition
- % in **Poor** condition

Performance measures by deck area:
- % in **Good** condition
- % in **Poor** condition
## Assessing Bridge Condition

### Classifications

<table>
<thead>
<tr>
<th>Score</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Excellent</td>
</tr>
<tr>
<td>8</td>
<td>Very Good</td>
</tr>
<tr>
<td>7</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5</td>
<td>Fair</td>
</tr>
<tr>
<td>4</td>
<td>Poor</td>
</tr>
<tr>
<td>3</td>
<td>Serious</td>
</tr>
<tr>
<td>2</td>
<td>Critical</td>
</tr>
<tr>
<td>1</td>
<td>“Imminent” Failure</td>
</tr>
<tr>
<td>0</td>
<td>Failed</td>
</tr>
</tbody>
</table>
Assessing Bridge Condition

Classifications and Measures
Minimum condition rating method …

- The lowest rating of Deck, Superstructure, and Substructure determines classification
- Culvert rating determines culvert classification

Bridge classification…

- **Good** when lowest rating is 7, 8, or 9
- **Fair** when lowest rating is 5 or 6
- **Poor** when lowest rating is 0, 1, 2, 3, or 4
Assessing Bridge Condition

§ 490.409 Metric Thresholds

<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>Bridge</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 (Item 58)</td>
<td>≥7</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Superstructure</td>
<td>≥7</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substructure</td>
<td>≥7</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (Item 62)</td>
<td>≥7</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Legend:
Good 9
Fair 8
Poor 7-0

Bridge Ratings from 0–9

<table>
<thead>
<tr>
<th>Item 58</th>
<th>Item 59</th>
<th>Item 60</th>
<th>Item 62</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck</td>
<td>Superstructure</td>
<td>Substructure</td>
<td>Culvert</td>
</tr>
<tr>
<td>≥7</td>
<td>≥7</td>
<td>≥7</td>
<td>≥7</td>
</tr>
<tr>
<td>5 or 6</td>
<td>5 or 6</td>
<td>5 or 6</td>
<td>5 or 6</td>
</tr>
<tr>
<td>≤4</td>
<td>≤4</td>
<td>≤4</td>
<td>≤4</td>
</tr>
</tbody>
</table>

Good: NBI ≥ 9
Fair: 7 ≤ NBI ≤ 8
Poor: NBI ≤ 6
Assessing Bridge Condition

Calculation

- Percent **Good** = total **deck area** of Good NHS bridges divided by total **deck area** of all NHS bridges. Precision is 0.1%

\[
100 \times \frac{\sum_{g=1}^{\text{GOOD}} \text{[Length} \times \text{Width]}_{\text{Bridge g}}}{\sum_{s=1}^{\text{TOTAL}} \text{[Length} \times \text{Width]}_{\text{Bridge s}}}
\]

- Percent **Poor** calculated similarly
§ 490.411 Minimum Condition and § 490.413 Penalty Provision

- Minimum condition level: ≤ 10% of total deck area of NHS bridges classified as Structurally Deficient
- Penalty: If for 3 consecutive years minimum condition level is not met, State must obligate and set aside NHPP funds for eligible projects on NHS bridges
Assessing Bridge Condition

- **Structurally Deficient (SD).** A status of SD was determined for a bridge by considering 5 items from the NBI (Prior Years).
- The primary purpose of a SD determination was to identify and classify bridges in poor condition.
- The definition of SD changed in 2018 to coincide with the Poor classification.

Bridge: 5 Items [→ 2018] 3 Items
Culvert: 3 Items [→ 1 Item]
Assessing Bridge Condition

Summary

• Condition-based performance measures and minimum condition level requirements

• Measures to be used for NHS Bridge asset management investment strategy decision support and reporting
Questions?

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Safety Performance Measures
Highway Safety Improvement Program
Overview of the Safety PM Rule

- Establishes 5 safety performance measures
  - Number of fatalities
  - Fatality rate
  - Number of serious injuries
  - Serious injury rate
  - Number of non-motorized fatalities and serious injuries
Overview of the Safety PM Rule

- State must establish a target for each safety performance measure based on 5 year rolling averages (on *all public roads*)
- CY 2018 State targets due in the 2017 HSIP Report
  - August 31, 2017 deadline
- Optional urbanized/non-urbanized targets for States
Overview of the Safety PM Rule

• MPOs establish targets 180 days after the State
  – By February 27 of the calendar year for which the targets apply
  – CY 2018 targets due by February 27, 2018

• MPOs shall coordinate with the State throughout target setting process
Two options to establish targets
- Agree to support the State DOT target; OR
- Establish numerical target specific to the MPO planning area

MPO Flexibility
- Can support all of the State targets;
- Establish their own targets for all the performance measures; or
- A combination of both
Safety Performance Measures

Target Setting
Figure 2. Chart. Required safety documents and agencies setting targets.
2018 Safety Performance Measure Targets – Louisiana

- Performance Measures
  - Fatalities
  - Fatality Rate
  - Serious Injuries
  - Serious Injury Rate
  - Non-motorized fatalities and serious injuries
- 1% annual decrease for each measure
- 2% decreasing target for 2018

Targets coordinated with LA Highway Safety Commission
## Louisiana Data Summary

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fatalities</td>
<td>724</td>
<td>704</td>
<td>737</td>
<td>752</td>
<td>758</td>
<td>735.0</td>
<td>721.0</td>
</tr>
<tr>
<td>Fatality Rate</td>
<td>1.547</td>
<td>1.473</td>
<td>1.526</td>
<td>1.560</td>
<td>1.547</td>
<td>1.531</td>
<td>1.493</td>
</tr>
<tr>
<td>Number of Serious Injuries</td>
<td>1,395</td>
<td>1,330</td>
<td>1,350</td>
<td>1,398</td>
<td>1,400</td>
<td>1,374.6</td>
<td>1,344.3</td>
</tr>
<tr>
<td>Serious Injury Rate</td>
<td>2.981</td>
<td>2.782</td>
<td>2.795</td>
<td>2.900</td>
<td>2.857</td>
<td>2.863</td>
<td>2.800</td>
</tr>
<tr>
<td>Number of Non-Motorized Fatalities and Serious Injuries</td>
<td>302</td>
<td>296</td>
<td>300</td>
<td>341</td>
<td>350</td>
<td>317.8</td>
<td>310.7</td>
</tr>
</tbody>
</table>
2018 MPO Safety Targets - Louisiana

• MPOs establish targets 180 days after the State
  – By February 27 of the calendar year for which the targets apply
  – CY 2018 targets due by February 27, 2018

• MPOs shall coordinate with the State throughout target setting process
• 23 states set increasing fatality targets
• 18 States set increasing fatality rate targets
• 17 States set increasing targets for number of serious injuries
• 16 States set increasing serious injury rate targets
• 26 States set increasing non-motorized fatalities and serious injuries
Coordination Cycle for 2018 Safety Targets

Target Setting Coordination
- By Spring 2017, begin engaging DOT, SHSO, and MPO stakeholders
- Set targets for CY 2018

Target Approval
By June, secure CY 2018 target approval from DOT/SHSO leadership

December 2019
Data available to evaluate targets

March 2020
States notified whether they met or made significant progress toward CY 2018 targets

2017
July 1
SHSO submits HSP to NHTSA including 3 identical safety targets

2018
August 31
State DOT submits HSIP Annual Report to FHWA, including safety targets

By February 27
MPOs establish safety targets

2019 - 2020

62
Questions?
System Performance Measures
- Travel Time Reliability

- **Interstate Travel Time Reliability Measure**
  - Percent of person-miles traveled on the Interstate that are reliable

- **Non-Interstate Travel Time Reliability Measure**
  - Percent of person-miles traveled on the non-Interstate NHS that are reliable
System Performance Measures
- Travel Time Reliability

Calculating the Proposed Performance Measures
**System Performance Measures - Travel Time Reliability**

*Reporting Segments – Mainline NHS*

Maximum Urban Length
½ mile*

Maximum Rural Length
10 miles*

*Unless an individual Travel Time Segment is longer*
## System Performance Measures - Travel Time Reliability

<table>
<thead>
<tr>
<th>Time</th>
<th>All Traffic (sec)</th>
<th>5-minute bins (105,120 per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 3</td>
<td></td>
<td>Feb 3 6:00 – 6:05am</td>
</tr>
<tr>
<td>Feb 3</td>
<td></td>
<td>Feb 3 6:05 – 6:10am</td>
</tr>
<tr>
<td>Feb 3</td>
<td></td>
<td>Feb 3 6:10 – 6:15am</td>
</tr>
<tr>
<td>Feb 3</td>
<td></td>
<td>Feb 3 6:15 – 6:20am</td>
</tr>
<tr>
<td>Feb 3</td>
<td></td>
<td>Feb 3 6:20 – 6:25am</td>
</tr>
<tr>
<td>Nov 7</td>
<td></td>
<td>Nov 7 6:25 – 6:30pm</td>
</tr>
<tr>
<td>Nov 7</td>
<td></td>
<td>Nov 7 6:30 – 6:35pm</td>
</tr>
<tr>
<td>Nov 7</td>
<td></td>
<td>Nov 7 6:35 – 6:40pm</td>
</tr>
<tr>
<td>Nov 7</td>
<td></td>
<td>Nov 7 6:40 – 6:45pm</td>
</tr>
<tr>
<td>Nov 7</td>
<td></td>
<td>Nov 7 6:45 – 6:50pm</td>
</tr>
</tbody>
</table>
## System Performance Measures - Travel Time Reliability

<table>
<thead>
<tr>
<th>Weekdays (Mon – Fri)</th>
<th>Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td>6am - 10am</td>
<td>6am - 8pm</td>
</tr>
<tr>
<td>10am - 4pm</td>
<td></td>
</tr>
<tr>
<td>4pm - 8pm</td>
<td></td>
</tr>
</tbody>
</table>
# System Performance Measures - Travel Time Reliability

### METRICS

- **Level of Travel Time Reliability (LOTTR)** of each time period of each reporting segment for the full extent:
  1. Interstate System
  2. Non-Interstate NHS

### Threshold

- **LOTTR** < 1.50 for the reporting segment = reliable

### Measures

- Percent of system providing for reliable travel times:
  1. Interstate System
  2. Non-Interstate NHS

### Interstate Example

- 30 sec (80th percentile)/15 sec (50th percentile)
- **LOTTR** = 2.00

- **2.00 > 1.50** = Not Reliable

- 8,125 reliable miles/10,000 total Interstate miles = **81.3% reliable**
### Travel Time Reliability Metrics

Assemble travel times in 5-minute bins, for each segment and each period.

<table>
<thead>
<tr>
<th>5-minute bins (up to 61,488 per year)</th>
<th>Avg Travel Time (EB)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All Traffic (sec)</strong></td>
<td></td>
</tr>
<tr>
<td>Feb 3 6:00 – 6:05am</td>
<td>26</td>
</tr>
<tr>
<td>Feb 3 6:05 – 6:10am</td>
<td>28</td>
</tr>
<tr>
<td>Feb 3 6:10 – 6:15am</td>
<td>36</td>
</tr>
<tr>
<td>Feb 3 6:15 – 6:20am</td>
<td>37</td>
</tr>
<tr>
<td>Feb 3 6:20 – 6:25am</td>
<td>36</td>
</tr>
<tr>
<td>Nov 7 6:25 – 6:30pm</td>
<td>27</td>
</tr>
<tr>
<td>Nov 7 6:30 – 6:35pm</td>
<td>--</td>
</tr>
<tr>
<td>Nov 7 6:35 – 6:40pm</td>
<td>26</td>
</tr>
<tr>
<td>Nov 7 6:40 – 6:45pm</td>
<td>25</td>
</tr>
<tr>
<td>Nov 7 6:45 – 6:50pm</td>
<td>26</td>
</tr>
</tbody>
</table>

#### System Performance Measures - Travel Time Reliability

**0.500 mi. segment (eastbound travel)**

- **All 5-min bins, 4 time periods**
  - 6-10am
  - 6am - 8pm
  - 10am – 4pm
  - 4-8pm

- **Full Year (Jan 1-Dec 31)**
Travel Time Reliability Metrics

Note the normal (50th percentile) and longer (80th percentile) travel times

Weekdays 6am – 10am

<table>
<thead>
<tr>
<th>Cumulative Probability</th>
<th>Travel Time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>10%</td>
<td>10</td>
</tr>
<tr>
<td>20%</td>
<td>20</td>
</tr>
<tr>
<td>30%</td>
<td>30</td>
</tr>
<tr>
<td>40%</td>
<td>40</td>
</tr>
<tr>
<td>50%</td>
<td>50</td>
</tr>
<tr>
<td>60%</td>
<td>60</td>
</tr>
<tr>
<td>70%</td>
<td>70</td>
</tr>
<tr>
<td>80%</td>
<td>80</td>
</tr>
<tr>
<td>90%</td>
<td>90</td>
</tr>
<tr>
<td>100%</td>
<td>100</td>
</tr>
</tbody>
</table>

50th Percentile: 35 seconds
80th Percentile: 44 seconds
System Performance Measures
- Travel Time Reliability

**Travel Time Reliability Metrics**
Determine the LOTTR Metric for each time period

\[
\frac{\text{Longer Travel Time (80th)}}{\text{Normal Travel Time (50th)}} = \frac{\# \text{ seconds}}{\# \text{ seconds}} = \text{Level of Travel Time Reliability Ratio}
\]

<table>
<thead>
<tr>
<th>Time Period</th>
<th>LOTTR Calculation</th>
<th>LOTTR Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday – Friday</td>
<td>6am – 10am</td>
<td>LOTTR = \frac{44 \text{ sec}}{35 \text{ sec}} = 1.26</td>
</tr>
<tr>
<td></td>
<td>10am – 4pm</td>
<td>LOTTR = 1.39</td>
</tr>
<tr>
<td></td>
<td>4pm – 8pm</td>
<td>LOTTR = 1.54</td>
</tr>
<tr>
<td>Weekends</td>
<td>6am – 8pm</td>
<td>LOTTR = 1.31</td>
</tr>
</tbody>
</table>

Must exhibit LOTTR below 1.50 during all of the time periods

Segment **does not** provide for reliable travel times
# System Performance Measures

## - Travel Time Reliability

### Calculating Travel Time Reliability Measure

Calculate the percentage of all reporting segments providing for reliable travel times

<table>
<thead>
<tr>
<th>Length</th>
<th>0.500 mi.</th>
<th>0.500 mi.</th>
<th>1.000 mi.</th>
<th>1.000 mi.</th>
<th>5.000 mi.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6am-10am</td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Red" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
</tr>
<tr>
<td>10am-4pm</td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Red" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
</tr>
<tr>
<td>4pm-8pm</td>
<td><img src="#" alt="Red" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Red" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
</tr>
<tr>
<td>Weekend</td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Green" /></td>
</tr>
</tbody>
</table>

| Reliability | ![Cross](#) | ![Check](#) | ![Cross](#) | ![Check](#) | ![Check](#) |

\[
\frac{6.500 \text{ reliable miles}}{8.000 \text{ total miles}} = 81.3\% \text{ Reliable}
\]
# System Performance Measures

## - Travel Time Reliability

### Measure vs. Target

<table>
<thead>
<tr>
<th>Entire Applicable Network</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEASURES</strong></td>
</tr>
<tr>
<td>Percent of system providing for reliable travel times.</td>
</tr>
<tr>
<td>Threshold: $&lt; 1.50$</td>
</tr>
<tr>
<td>1. Interstate System</td>
</tr>
<tr>
<td>2. Non-Interstate NHS</td>
</tr>
<tr>
<td><strong>TARGETS</strong></td>
</tr>
<tr>
<td>1. % of Interstate System provides reliable travel times;</td>
</tr>
<tr>
<td>2. % of non-Interstate NHS provides reliable travel times</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interstate Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>81.3%</strong></td>
</tr>
<tr>
<td>Interstate miles providing for reliable travel times</td>
</tr>
</tbody>
</table>

| Target: 80.0 %    |
| Actual: 81.3 %   |
| **Target Achieved** |
System Performance Measures
- Travel Time Reliability

Timeline for Biennial Performance Reporting

1st Performance Period
- Baseline Performance Period Report (due Oct 1, 2018)
- Mid Performance Period Progress Report (due Oct 1, 2020)

2nd Performance Period
- Baseline Performance Period Report (due Oct 1, 2022)
- Mid Performance Period Progress Report (due Oct 1, 2024)
- Full Performance Period Progress Report (due Oct 1, 2026)
• Interstate Travel Time Reliability Measure
  – Percent of person-miles traveled on the Interstate that are reliable

• Non-Interstate Travel Time Reliability Measure
  – Percent of person-miles traveled on the non-Interstate NHS that are reliable
• **Measurement of travel time reliability on the Interstate** – base on the % of Interstate system mileage providing for reliable truck travel time (Truck Travel Time Reliability (TTTR) Index)
System Performance Measures
- Freight Reliability
**23 CFR 490.611 Freight Reliability Metric**

\[
\text{Longer Truck Travel Time (95th)} = \frac{\# \text{ seconds}}{\text{Normal Truck Travel Time (50th)}} = \text{TTTR Ratio}
\]

<table>
<thead>
<tr>
<th>Time Period</th>
<th>TTTR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TTTR: Single Segment, Interstate Highway System</strong></td>
<td></td>
</tr>
<tr>
<td>Monday – Friday</td>
<td></td>
</tr>
<tr>
<td>6 – 10 a.m.</td>
<td>( \frac{63 \text{ sec}}{42 \text{ sec}} = 1.50 )</td>
</tr>
<tr>
<td>10 a.m. – 4 p.m.</td>
<td>( \frac{62 \text{ sec}}{45 \text{ sec}} = 1.38 )</td>
</tr>
<tr>
<td>4 – 8 p.m.</td>
<td>( \frac{85 \text{ sec}}{50 \text{ sec}} = 1.70 )</td>
</tr>
<tr>
<td>Weekends</td>
<td></td>
</tr>
<tr>
<td>6 a.m. – 8 p.m.</td>
<td>( \frac{52 \text{ sec}}{40 \text{ sec}} = 1.30 )</td>
</tr>
<tr>
<td>Overnight</td>
<td></td>
</tr>
<tr>
<td>8 p.m. – 6 a.m.</td>
<td>( \frac{46 \text{ sec}}{38 \text{ sec}} = 1.21 )</td>
</tr>
<tr>
<td>Maximum TTTR</td>
<td><strong>1.70</strong></td>
</tr>
</tbody>
</table>
Accountability and Transparency in Performance Management

Significant Progress

- State Establishes Targets
  - Improving, Constant or Declining
- Determination
  - Is the actual equal or better than the established target?
    - OR
  - Is the actual better than the baseline?

Any improvement from baseline is significant

Baseline

Actual must be equal or better than target
Performance Period and State DOT Biennial Performance Reporting

1st Performance Period for Emission Reduction Measure

Baseline Performance Period Report (due Oct 1, 2018)
Mid Performance Period Progress Report (due Oct 1, 2020)

2nd Performance Period for Emission Reduction Measure

Full Performance Period Progress Report (due Oct 1, 2022)

1st Performance Period for All Other Measures

Baseline Performance Period Report (due Oct 1, 2022)
Mid Performance Period Progress Report (due Oct 1, 2024)

2nd Performance Period for All Other Measures

Full Performance Period Progress Report (due Oct 1, 2026)
• **On Road Mobile Source Emissions Measure**
  • A measure that will assess total emissions reductions by applicable pollutants under the Congestion Mitigation and Air Quality (CMAQ) program

• **Cumulative 2-year and 4-year Emission Reductions (kg/day)** for CMAQ funded projects of reduced emissions of:
  • **Nitrogen Oxides (NOx)**
  • **Volatile Organic Compounds (VOCs)**
  • **Carbon Monoxide (CO)**
  • **Particulate Matter (PM10 and PM 2.5)**
On Road Mobile Source Emissions Measure
On Road Mobile Source Emissions Measure

**Public Access System Submittal Timeline**

- **Starting-point of On-Road Mobile Source Emissions Performance Period (Oct 1, 2017)**
- **Baseline Performance Period Report (Oct 1, 2018)**: State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2018)
- **Mid-Performance Period Report (Oct 1, 2020)**: State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2020)
- **End-Point of On-Road Mobile Source Emissions Performance Period (Oct 1, 2021)**
- **Full Performance Period Report (Oct 1, 2022)**: State DOTs submit data from previous fiscal year to CMAQ Project Tracking System (March 1, 2021)
Data Timeline for the 1st Performance Period

- Baseline Performance Period
  - Latest data collected*

- Mid Performance Period
  - Federal Fiscal Years 2018 and 2019
  - 2 years of data

- Full Performance Period
  - Federal Fiscal Years 2018 through 2021
  - 4 years of data

*Baseline data for the first performance period would include CMAQ project from FY 2014-2017.
On Road Mobile Source Emissions Measure

Performance Period & State DOT Biennial Performance Reporting Timeline

1st Performance Period for Emission Reduction Measure
- Baseline Performance Period Report (due Oct 1, 2018)
- Mid Performance Period Progress Report (due Oct 1, 2020)

2nd Performance Period for Emission Reduction Measure
- Full Performance Period Progress Report (due Oct 1, 2022)

1st Performance Period for All Other Measures
- Full Performance Period Progress Report (due Oct 1, 2024)

2nd Performance Period for All Other Measures
- Full Performance Period Progress Report (due Oct 1, 2026)
On Road Mobile Source Emissions Measure

Knowledge Check: Which Pollutants Are to Reported?

*Emissions reductions need to be calculated for which of the following pollutants?*

a) Carbon Dioxide (CO₂), Nitrogen Oxides (NOx), Sulfur Dioxide (SO₂), and Particulate Matter (PM\textsubscript{2.5} and PM\textsubscript{10})

b) Nitrogen Oxides (NOx), Volatile Organic Compounds (VOCs), Carbon Monoxide (CO), and Particulate Matter (PM\textsubscript{2.5} and PM\textsubscript{10})

c) Carbon Monoxide (CO), Total Hydrocarbons (THC), Hazardous Air Pollutants (HAPs), and Nitrogen Oxides (NOx)

d) Ozone (O₃), Carbon Monoxide (CO), and Particulate Matter (PM\textsubscript{2.5} and PM\textsubscript{10})
Knowledge Check: Calculating the Measure

What are the units of the on-road mobile source emissions measure?

a) Tons per year
b) Grams per mile
c) Kilograms per day
Knowledge Check: State DOT Target Setting

A State DOT needs to set quantifiable targets for what time periods in the Baseline Performance Report?

a) 5-year and 10-year targets  
b) 2-year and 4-year targets  
c) 4-year targets  
d) 2-year targets
Measures that Do not apply to Louisiana until second performance period, beginning Jan. 1, 2022 (no areas over 1 Million in population)

- Peak Hour Excessive Delay Measure
- Non-Single Occupancy Vehicle (SOV) Travel Measure

- ***While the published rule includes a Green House Gas measure, the effective date of the portions of the Final Rule pertaining to that measure has been delayed.
November 15, 2018: MPO establishes targets
   - May 20, 2018: DOTD establishes 2- and 4- year targets

Targets should be mutually agreed upon by both DOTD and MPO

Need to determine who is going to do the work on the Travel time measurements

Report baseline level and progress toward target in Metropolitan Transportation Plan, etc.
   - DOTD will provide a Baseline Performance Plan by October 1, 2018

States and MPOs will have the data they need for some of these measurements in FHWA’s National Performance Management Research Data Set (NPMRDS)
23 CFR 450.314 (h) Performance Based Planning and Programming (PBPP)

The MPO(s), State(s), and the providers of public transportation shall jointly agree upon and develop specific written provisions for cooperatively developing and sharing information related to transportation performance data, the selection of performance targets, the reporting of performance targets, the reporting of performance to be used in tracking progress toward attainment of critical outcomes for the region of the MPO (see §450.306(d)), and the collection of data for the State asset management plans for the NHS for each of the following circumstances: When one MPO serves an UZA, when more than one MPO serves an UZA, and when an MPA includes an UZA that has been designated as a TMA as well as a UZA that is not a TMA.
Performance Based Planning

Planning
- Goals and Objectives
- Performance Measures

Analysis
- Trends and Targets
- Strategies and Alternatives
- Develop Investment Priorities

Programming
- Investment Plan
- Resource Allocation
- Program of Projects

Implementation and Evaluation
- Monitoring
- Evaluation
- Reporting

Formalize State DOT and MPO PBP Agreements
- State and Regional Vision
- Historical Data
- Forecasting Demand
- Scenario Analysis
- Economic Analysis
- Stakeholder Coordination
- Public Involvement
- Investment Prioritization

Performance Based Planning (PBP)
Performance Based Planning and Programming (PBPP) cont......

.....These provisions shall be documented either as part of the metropolitan planning agreements required under paragraphs (a), (e), and (g) of this section, or documented in some other means outside of the metropolitan planning agreements as determined cooperatively by the MPO(s), State(s), and providers of public transportation.

- How will LADOTD and MPO’s document PBPP agreements and targets?
- Formal documentation = approved by the MPO Policy Board