What is Transportation Performance Management (TPM)

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

MAP-21 (2012) established the Federal framework for TPM and the FAST Act (2015) codified the process and requirements for USDOT, State DOTs, transit providers, and MPOs.

- NCDOT has an existing data-driven TPM process that includes Strategic Transportation Investments (STI) and tracking of organization and system performance.

- TPM is intended to create a data-driven process within transportation planning and programming, answering: where do we want to go, how are we going to get there, what will it take, and how did we do?
## MAP-21 & FAST Act – TPM Rulemakings

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<td>23 CFR 490 (Sub. A, E, F, G, H)</td>
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### TPM Rules for USDOT:
- Establish measures; identify data sources; define metrics
- Report to Congress
- Stewardship and oversight

### TPM Rules for States & MPOs:
- Interagency coordination
- Establish targets
- Support national goals and consider measures and targets in long range plans
- Report progress to USDOT (States)
In October 2017, NCDOT Transportation Planning Division (TPD) started to compile data and organize internal and external partners to address the TPM requirements. The process included regular coordination with a Work Group and Subject Matter Experts as well as collaboration with FHWA to confirm requirements and with Metropolitan Planning Organizations to ensure their role within the process. This integrated approach helped develop targets - based on the latest available data and federal guidance - to support a technical and business process. NCDOT leadership provided strategic direction to staff at key milestones.
TPM Target Setting Process

Assess...
Baseline NCDOT preparedness, current practice, data and tool gaps

Evaluate Possible Targets...
Performance trends, internal and external factors, analysis tools, future projections, target setting process

Recommend Targets....
2 & 4-year numerical targets, leadership and stakeholder review, refinement and rationale

Document...
Steps, decisions, process evolution/documentation

This process supports a transparent, repeatable, and engagement based approach understood by NCDOT stakeholders, including the MPOs. It enables approach streamlining into the future – as the federal process is continuous, with system performance tracking occurring annually and target setting revisited biannually.
National Highway System (relevant system for PM2 and PM3 measures and targets)

<table>
<thead>
<tr>
<th>NC Designation</th>
<th>Route Miles</th>
<th>% NHS Route Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>13,785</td>
<td>30%</td>
</tr>
<tr>
<td>Secondary</td>
<td>64,831</td>
<td>0.3%</td>
</tr>
<tr>
<td>Interstate</td>
<td>1,340</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>79,956</td>
<td>7%</td>
</tr>
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</table>

Note: values rounded for approximation

7.0% NHS route mile share of total NCDOT maintained miles
TPM (FHWA & FTA) Measures & Targets

17 total FHWA measures (PM1, 2, 3)
- Describes the applicability of the measures
- Identifies data needed to support measures
- Includes target due dates
- Describes performance period, reporting requirements and timeline
- Defines significant progress determination

**Final Rules (FHWA – 23 CFR 490)**

<table>
<thead>
<tr>
<th>States Set Targets By</th>
<th>NCDOT Status</th>
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<tbody>
<tr>
<td><strong>PM1 – Safety (5 measures)</strong></td>
<td>Aug. 31, 2017</td>
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<td><strong>PM2 – Pavement/Bridge (6 measures)</strong></td>
<td>May 20, 2018</td>
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<td><strong>PM3 – System Performance (6 measures)</strong></td>
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**PM1 - Highway Safety Performance Measures**

1. Number of fatalities
2. Fatality rate (per 100 million VMT)
3. Number of serious injuries
4. Serious injury rate (per 100 million VMT)
5. Number of non-motorized fatalities and serious injuries

**PM2 – Pavement/Bridge Performance Measures**

6. % of pavements on the Interstate system in good condition
7. % of pavements on the Interstate system in poor condition
8. % of pavements on the non-Interstate NHS in good condition
9. % of pavements on the non-Interstate NHS in poor condition
10. % of NHS bridges classified as in good condition
11. % of NHS bridges classified as in poor condition

**PM3 - System Performance / Freight / CMAQ Performance Measures**

12. % of person miles on the Interstate system that are reliable
13. % of person miles on the non-Interstate NHS that are reliable
14. % of Interstate mileage providing for reliable truck travel times
15. Annual hours of peak-hour excessive delay per capita
16. Percent of non-single occupant vehicle travel
17. Total emissions reduction (CMAQ projects)

FY2018 targets adopted
Targets set annually

2019 and 2021 statewide targets set
Interstate Pavement Condition (Good)

**PM2 Measure:**
Percentage of Interstate pavement in “Good” condition:
Total interstate lane miles in good condition based on IRI (measure of pavement smoothness), cracking percent, and rutting or faulting. All condition metrics must exhibit good to classify pavement as good.

**Performance Trend:**
Federal guidance is still being reviewed for measure/metric computational analysis and application. NCDOT completing transition to full extent data collection to support IRI elemental data review.

**4-Year Target**
(1/1/2018 – 12/31/2021)
37.0% % of Interstate pavement in Good condition

**Approach**
- Understand measure definition and underlying data (including data collection methods).
- Evaluate trend, external factors, and internal factors impacting future performance.

**Address**
- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- The first performance period - January 1st, 2018 through December 31st, 2021
- NCDOT transition to full-extent data collection in 2017, enabling improved performance tracking.

**Assumptions**
- Funding stability
- State-driven targets, not Federal budget allocations
- Overall Interstate VMT growth and truck VMT growth
- Maintain balance, levels of percent good v. fair

**Accountable**
- Pavement Management Unit, Division of Highways
- Note, the actual 2-year condition (2018 and 2019) will become the baseline condition for the first performance period for this measure.
Interstate Pavement Condition (Poor)

PM2 Measure:
Percentage of Interstate pavement in “Poor” condition:
Total interstate lane miles in poor condition based on IRI (measure of pavement smoothness), cracking percent, and rutting or faulting. If one condition metric exhibits poor, the segment is classified as poor pavement.

Performance Trend:
Target set below minimum 5% federal threshold for “poor” condition. Federal guidance is still being reviewed for measure/metric computational analysis and application. NCDOT completing transition to full extent data collection to support IRI elemental data review.

4-Year Target
(1/1/2018 – 12/31/2021)
2.2% % of Interstate pavement in Poor condition

Approach
• Understand measure definition and underlying data (including data collection methods).
• Evaluate trend, external factors, and internal factors impacting future performance.

Address
• Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
• The first performance period - January 1st, 2018 through December 31st, 2021
• NCDOT transition to full-extent data collection in 2017, enabling improved performance tracking.

Assumptions
• Funding stability
• State-driven targets, not Federal budget allocations
• Overall Interstate VMT growth and truck VMT growth
• Maintain balance, levels of percent good v. poor

Accountable
• Pavement Management Unit, Division of Highways
• Federal threshold (minimum): If more than 5% of Interstate pavement is rated in Poor condition for any year, the State must obligate NHPP funds and transfer STP funds to improve pavement.
Non-Interstate NHS Pavement Condition (Good)

PM2 Measure:
Percentage of Non-Interstate NHS pavement in “Good” condition:
Total non-Interstate NHS lane miles in good condition based on IRI (measure of pavement smoothness), cracking percent, and rutting or faulting. All condition metrics must exhibit good to classify pavement as good.

Performance Trend:
Federal guidance is still being reviewed for measure/metric computational analysis and application. NCDOT completing transition to full extent data collection to support IRI elemental data review. Influence of any data “noise” is magnified on Non-Interstate (impacts larger number of miles).

2-Year Target
(1/1/2018 – 12/31/2019)
27.0% % of non-Interstate NHS pavement in Good condition

4-Year Target
(1/1/2018 – 12/31/2021)
21.0% % of non-Interstate NHS pavement in Good condition

Approach
- Understand measure definition and underlying data (including data collection methods).
- Evaluate trend, external factors, and internal factors impacting future performance.

Assumptions
- Interstate system analysis concerns are magnified for the non-Interstate NHS network
- Restrictive use of chip seal treatment
- Difficult to keep good facilities “good” and to accurately track
- Timing and gaps of data collection and reporting

Address
- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- The first performance period - January 1st, 2018 through December 31st, 2021
- 8.5% invalid data influence on trend analysis and target setting.

Accountable
- Pavement Management Unit, Division of Highways
- For non-Interstate pavement targets, FHWA will make a determination of significant progress at the midpoint and end of the first performance period.
Non-Interstate NHS Pavement Condition (Poor)

PM2 Measure:
Percentage of Non-Interstate NHS pavement in “Poor” condition:
Total non-Interstate NHS lane miles in poor condition based on IRI (measure of pavement smoothness), cracking percent, and rutting or faulting. If one condition metric exhibits poor, the segment is classified as poor pavement.

Performance Trend:
Federal guidance is still being reviewed for measure/metric computational analysis and application. NCDOT completing transition to full extent data collection to support IRI elemental data review. Influence of any data “noise” is magnified on Non-Interstate (impacts larger number of miles).

2-Year Target (1/1/2018 – 12/31/2019)
4.2% % of non-Interstate NHS pavement in Poor condition

4-Year Target (1/1/2018 – 12/31/2021)
4.7% % of non-Interstate NHS pavement in Poor condition

Approach
- Understand measure definition and underlying data (including data collection methods).
- Evaluate trend, external factors, and internal factors impacting future performance.

Address
- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- The first performance period - January 1st, 2018 through December 31st, 2021
- 8.5% invalid data influence on trend analysis and target setting.

Assumptions
- Interstate system analysis concerns are magnified for the non-Interstate NHS network
- Restrictive use of chip seal treatment
- Timing and gaps of data collection and reporting

Accountable
- Pavement Management Unit, Division of Highways
- No minimum threshold requirement.
- For non-Interstate pavement targets, FHWA will make a determination of significant progress at the midpoint and end of the first performance period.
NHS Bridge Condition (Good)

PM2 Measure:

Percentage of NHS bridges by deck area classified in “Good” condition:

Total deck area of NHS bridges and culverts where all components (deck, superstructure, substructure for bridges) are assigned a condition rating of “Good” or better based on annual inspections, compared to total NHS bridge deck area.

Performance Trend:

Percent of NHS bridge deck area in good condition has steadily decreased since 2013. Federal approach is different and more stringent compared to NCDOT Bridge Health Index, which tracks by structure and average condition (and shows an improving trend since 2013).

2-Year Target (1/1/2018 – 12/31/2019)

33.0% % of NHS bridges by deck area in Good condition

4-Year Target (1/1/2018 – 12/31/2021)

30.0% % of NHS bridges by deck area in Good condition

Approach

- Understand measure definition and underlying data, including differences with NCDOT Bridge Health Index (BHI).
- Evaluated trend, external factors, and internal factors impacting future performance.
- Includes all NHS bridges and culverts over 20 ft. in length.

Assumptions

- NCDOT responsible for the collection of all bridge condition data necessary to set targets.
- Targets consistent with findings of Transportation Asset Management Plan (TAMP) analysis and evaluation of bridges consistent with Federal measure.

Address

- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- The first performance period - January 1st, 2018 through December 31st, 2021

Accountable

- Structures Management Unit, Division of Highways
- Takes into account the number of NHS bridge replacements expected over next 10 years.
- No minimum threshold requirement.
**NHS Bridge Condition (Poor)**

**PM2 Measure:**

Percentage of NHS bridges by deck area classified in “Poor” condition:

Total deck area of NHS bridges and culverts where one component (deck, superstructure, substructure for bridges) is assigned a condition rating of “Poor” based on annual inspections, compared to total NHS bridge deck area.

**Performance Trend:**

- 2013: 8.2%
- 2014: 8.5%
- 2015: 8.3%
- 2016: 6.0%
- 2017: 7.0%

Percent of NHS bridge deck area in poor condition has decreased since 2013. The Federal approach is comparable to the NCDOT percent Structurally Deficient bridges measure, enabling a comparison in performance trends.

**2-Year Target** (1/1/2018 – 12/31/2019)

8.0% % of NHS bridges by deck area in Poor condition

**4-Year Target** (1/1/2018 – 12/31/2021)

9.0% % of NHS bridges by deck area in Poor condition

**Approach**

- Understand measure definition and underlying data, including alignment with NCDOT % Structurally Deficient Bridges measure.
- Evaluated trend, external factors, and internal factors impacting future performance.
- Includes all NHS bridges and culverts over 20 ft. in length.

**Address**

- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- The first performance period - January 1st, 2018 through December 31st, 2021

**Assumptions**

- NCDOT responsible for the collection of all bridge condition data necessary to set targets.
- Targets consistent with findings TAMP analysis and evaluation of bridges consistent with Federal measure.
- Target influenced by NCDOT 2030 goal and BMIP strategy

**Accountable**

- Structures Management Unit, Division of Highways
- **Federal threshold (minimum):** If more than 10% of NHS bridge deck area is rated in Poor condition for three consecutive years, the State must obligate NHPP funds for eligible bridge projects on the NHS.
Interstate Travel Time Reliability

PM3 Measure:
Interstate LOTTR (Level of Travel Time Reliability):
Reliability measure (based on 80th percentile travel time v. 50th percentile travel time, sourced from in-vehicle GPS and mobile sources) is combined with person miles traveled to estimate the percent of person miles traveled that are reliable.

Performance Trend:
Since 2013, Interstate LOTTR in North Carolina has steadily decreased by 1.0% to 1.5% annually. This trend is primarily impacted by continuing VMT growth and traffic incidents, and can also be impacted by work zones.

Approach
• Focus on analysis-driven approach, resulting in simple, objective target setting process.
• Considered external and internal factors impacting 2- and 4-year performance including VMT growth, work zones and current project completions, and potential benefits of incident management / ITS strategies.

Assumptions
• Targets consistent with average annual 5-year trend of 1.5% per year decline through 2019, and steeper decline through 2021.
• Continued VMT growth outpaces other factors that might change trend direction.
• Maintains conservative stance given external and internal factors.

Address
• Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
• The first performance period - January 1st, 2018 through December 31st, 2021

Accountable
• Traffic System Operations, Transportation Mobility and Safety, Division of Highways
• FHWA will not make a significant progress determination for reliability measures.

2-Year Target (1/1/2018 – 12/31/2019)
80.0%
Interstate percent of person miles traveled that are reliable

4-Year Target (1/1/2018 – 12/31/2021)
75.0%
Interstate percent of person miles traveled that are reliable
Non-Interstate NHS Travel Time Reliability

**PM3 Measure:**

Non-Interstate NHS LOTTR (Level of Travel Time Reliability): Reliability measure (based on 80th percentile travel time v. 50th percentile travel time, sourced from in-vehicle GPS and mobile sources) is combined with person miles traveled to estimate the percent of person miles traveled that are reliable.

**Performance Trend:**

Since 2013, Non-Interstate NHS LOTTR in North Carolina has steadily decreased by 2.9% to 3.9% annually. This trend is primarily impacted by continuing VMT growth and traffic incidents, and can also be impacted by land use decisions and weekend travel.

*Note: 2016 to 2017 data shift a result of FHWA vendor change and data expansion, not change in performance.*

**4-Year Target**

(1/1/2018 – 12/31/2021)

70.0% Non-Interstate NHS percent of person miles traveled that are reliable

**Approach**

- Focus on analysis-driven approach, resulting in simple, objective target setting process.
- Considered external and internal factors impacting 2- and 4-year performance including VMT growth, work zones and current project completions, and potential benefits of incident management / ITS strategies.

**Address**

- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- The first performance period - January 1st, 2018 through December 31st, 2021
- Note the data vendor, collection, and process shift in 2017.

**Assumptions**

- Targets consistent with maximum past 5-year trend of 3.9% per year decline through 2021.
- Continued VMT growth outpaces other factors that might change trend direction.
- Maintains conservative stance given external and internal factors.

**Accountable**

- Traffic System Operations, Transportation Mobility and Safety, Division of Highways
- FHWA will not make a significant progress determination for reliability measures.
Truck Travel Time Reliability (Interstate)

PM3 Measure:

Interstate TTTR (Truck Travel Time Reliability):
Reliability measure based on the worst 95th percentile truck travel time v. 50th percentile truck travel time, sourced from in-vehicle GPS and fleet data) is averaged across the length of all Interstate segments.

Performance Trend:

Since 2013, Interstate TTTR in North Carolina has steadily increased by 1.7% annually. This trend is primarily impacted by continuing truck VMT growth and traffic incidents, and can also be impacted by work zones.

*2016 to 2017 data shift a result of FHWA vendor change.

2-Year Target (1/1/2018 – 12/31/2019)

1.65 Interstate truck travel time reliability index

4-Year Target (1/1/2018 – 12/31/2021)

1.70 Interstate truck travel time reliability index

Approach

• Focus on analysis-driven approach, resulting in simple, objective target setting process.
• Considered external and internal factors impacting 2- and 4-year performance including work zones and project completions, weigh station locations, incident management, and truck volumes.

Address

• Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
• The first performance period - January 1st, 2018 through December 31st, 2021
• Increased data coverage in 2017 is primary driver for performance change

Assumptions

• Targets consistent with maximum past 5-year trend of 3.4% per year increase through 2019 and increasing trend through 2021.
• Related to decrease in LOTTR performance (TTTR focuses on the ratio, not the percent of travel).
• Maintains conservative stance given external and internal factors.

Accountable

• Traffic System Operations, Transportation Mobility and Safety, Division of Highways
• FHWA will not make a significant progress determination for reliability measures.
PM3 Measure:
Percent of Non-Single Occupant Vehicle (Non-SOV) travel:
Percent of personal commute trips that occur by non-SOV mode within applicable urbanized areas (UZA). Applicable UZAs are: areas with population > 1 million, areas with NHS mileage, and areas in non-attainment or maintenance for criteria air pollutants.

Performance Trend:
Since 2013, commute trip non-SOV mode share in the Charlotte urbanized area has trended slightly downward, per the U.S. Census 5-year estimates in the American Communities survey.

2-Year Target (1/1/2018 – 12/31/2019)
21.0% Non-SOV travel in the Charlotte urbanized area

4-Year Target (1/1/2018 – 12/31/2021)
21.0% Non-SOV travel in the Charlotte urbanized area

Approach
• Applicable States and MPOs must set single, unified targets for the UZA.
• Considered external and internal factors impacting 2- and 4-year performance including VMT and population growth.
• Trend data sourced from the U.S. Census Bureau, American Communities Survey.

Assumptions
• Rapid population growth of the previous 4-years within the region will continue at a similar pace.
• STIP and TIP projects in the pipeline are unlikely to change the performance trend.
• Impact of managed lanes and transit expansion on SOV travel are uncertain; impacts are unlikely to be significant in the next two or four years.

Address
• Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
• The first performance period - January 1st, 2018 through December 31st, 2021

Accountable
• Transportation Planning Division, Chief Deputy of the Secretary’s Office
• FHWA will not make a significant progress determination for CMAQ measures.
**PM3 Measure:**

Annual Hours of Peak-Hour Excessive Delay (PHED) per Capita:
Where excessive delay is the added time spent in congested conditions (20 mph or 60% of posted speed limit) within applicable urbanized areas (UZA). Applicable UZAs are: areas with population > 1 million, areas with NHS mileage, and areas in non-attainment or maintenance for criteria air pollutants.

**Performance Trend:**

From 2014 to 2017, annual PHED per capita in the Charlotte UZA has steadily increased. Data is sourced from in-vehicle GPS and mobile sources through FHWA vendor.

**4-Year Target**

(1/1/2018 – 12/31/2021)

34.0

Annual hours of excessive delay per capita in the Charlotte urbanized area

**Approach**

- Applicable States and MPOs must set single, unified targets for the UZA.
- Considered external and internal factors impacting 4-year performance including VMT and population growth.
- Applies only to weekday peak periods (selected worst performing 4-hour peak period, 3-7 pm).

**Address**

- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- The first performance period - January 1st, 2018 through December 31st, 2021

**Assumptions**

- Rapid population growth of the previous 4-years within the region will continue at a similar pace.
- STIP and TIP projects in the pipeline are unlikely to change the performance trend.
- Minor benefits from project completions likely offset by new work zone impacts.

**Accountable**

- Transportation Planning Division, Chief Deputy of the Secretary’s Office
- FHWA will not make a significant progress determination for CMAQ measures.
### Congestion Mitigation & Air Quality – Emissions

**PM3 Measure:**

**On-Road Emission Reduction from CMAQ Projects:**
Total cumulative average daily emission reduction for applicable criteria pollutants for each MPO within an air quality non-attainment or maintenance area boundary. Individual MPO targets are summed to establish the statewide target.

**Performance Trend:**

2014-2017 Range (kg/day)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>5.76</td>
<td>17.36</td>
</tr>
<tr>
<td>VOC</td>
<td>0.13</td>
<td>2.75</td>
</tr>
<tr>
<td>NOx</td>
<td>1.18</td>
<td>8.20</td>
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</table>

Emission benefits are highly variable from year to year and are dependent upon the CMAQ projects selected and implemented by local programs.

Source: CMAQ Public Access System - State DOTs enter project information into the system by March 1 for each CMAQ project funded in the previous Federal fiscal year.

**Approach**

- Measures cumulative 2-year and 4-year emission reductions for CMAQ funded projects
- Targets are set for the portion of the State and for each MPO within the maintenance area boundary
- Each MPO sets its own target; the State target is the sum of the MPO targets

**Address**

- Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
- CMAQ project schedules and authorization dates are uncertain and may change future targets based on data available at a later time.

**Assumptions**

- Yearly emission benefits are highly variable dependent on project type and project delivery
- CMAQ project applications from 2016-2019 show improved emission benefits compared to the 2014-2017 authorized projects that informed target setting.

**Accountable**

- Transportation Planning Division, Chief Deputy of the Secretary’s Office
- FHWA will not make a significant progress determination for CMAQ measures.

**2-Year Target** (1/1/2018 – 12/31/2019)

- CO: 11.522 kg/day
- VOC: 0.252 kg/day
- NOx: 2.360 kg/day

Total emissions reduction in Charlotte maintenance area

**4-Year Target** (1/1/2018 – 12/31/2021)

- CO: 23.044 kg/day
- VOC: 0.504 kg/day
- NOx: 4.720 kg/day

Total emissions reduction in Charlotte maintenance area
Ongoing TPM Process and Reporting

The TPM process is continuous, requiring annual data submittals through Federal data systems and bi-annual review of performance and targets, both at the State and MPO level.

### 1st Report Period for all Measures (except CMAQ Emissions Reduction Measure)

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Apr</th>
<th>Jul</th>
<th>Oct</th>
<th>Jan</th>
<th>Apr</th>
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Note: 1st Period for Emissions Reduction Measure is 10/2017 to 10/2021

### 2nd Performance Period for all Measures (except CMAQ Emissions Reduction Measure)

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Apr</th>
<th>Jul</th>
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<th>Jan</th>
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Note: 2nd Period for Emissions Reduction Measure is 10/2021 to 10/2026

The TPM process is integrated with the statewide and metropolitan transportation planning and programming process. MAP-21 and the FAST Act establish planning requirements for State DOTs, MPOs, and transit operators that integrate TPM with the adoption of STIPs/TIPs and Long-Range Transportation Plans (LRTPs) / Metropolitan Transportation Plans (MTP).

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