

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. Strategic Direction





MAP-21 & FAST Act – TPM Rulemakings



TPM-Related Rules	Regulatory Chapter	
Statewide and Non-Metropolitan Planning; Metropolitan Planning	23 CFR 450 & 771, 49 CFR 613	Establishes g framework
Safety Performance Measures (PM1)	23 CFR 490 (Subpart A & B)	Highway Sa Data collectio
Highway Safety Improvement Program (HSIP)	23 CFR 924	target settinន programminន
Highway Asset Management Plans for NHS	23 CFR 515 & 667	Highway As Data collection
Pavement and Bridge Condition Measures (PM2)	23 CFR 490 (Subpart A, C & D)	target setting programming
Performance of the NHS, Freight, and CMAQ Measures (PM3)	23 CFR 490 (Sub. A, E, F, G, H)	System Per Reporting an for highway i and emission
Transit Asset Management Rule	49 CFR 625, 630	Transit Asse Data collectic target setting programming

goals and TPM

afety: ion, reporting, ig and g approach

ssets: on, reporting, g and g approach

rformance:

nd target setting mobility, freight, ns

ets:

on, reporting, g and programming for FTA recipients

TPM Rules for States & MPOs: TPM Rules for USDOT: □ Interagency coordination Establish measures; identify data sources; define metrics **Establish targets** Report to Congress Support national goals and consider □ Stewardship and oversight measures and targets in long range plans □ Report progress to USDOT (States)





TPM Target Setting Organization

Technical Process



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.

Task	Jan	Feb	March	April	May	June
Agency Assessment				E readiness ar	nd data interv	views
Target Setting Approaches				Target co	llaboration, i	initial targets
Recommended Targets				т 🗖 🗧	arget finaliza	tion
Documentation					→ 📩	
Briefings	Σ		☆	\$\$	2	
🕀 Work Group Meeting 📩 Briefings (External / Exec) 📈 Target submission to FHWA						
Briefings (BOT) I NCDOT TPM Process Repo		ocess Report				
NСтрм ()						

TPM Target Setting Process



Assess... **Baseline NCDOT preparedness**, current practice, data and tool gaps **Evaluate Possible** Performance trends, internal and external factors, analysis tools, future Targets... projections, target setting process Recommend 2 & 4-year numerical targets, leadership and stakeholder review, Targets.... refinement and rationale Steps, decisions, process Document... evolution/documentation

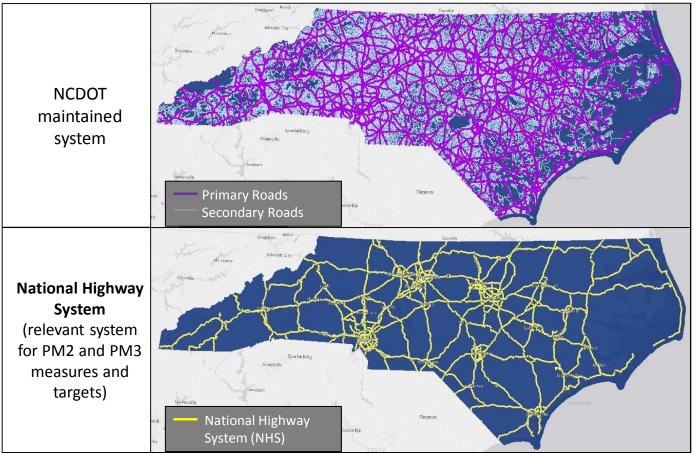
This process supports a transparent, repeatable, and engagement based approach understood by NCDOT stakeholders, including the MPOs. It enables approach streamlining into the future – as the federal process is continuous, with system performance tracking occurring annually and target setting revisited biannually.



System Definition



 NC_{II}



NC Designation Route Miles		% NHS Route Miles
Primary	13,785	30%
Secondary	64,831	0.3%
Interstate	1,340	100%
Total	79,956	7%

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)

- o Describes the applicability of the measures
- o Identifies data needed to support measures
- o Includes target due dates
- Describes performance period, reporting requirements and timeline
- o Defines significant progress determination

Performance measure: an

expression based on a metric used to establish targets and to assess progress toward targets

Target: a quantifiable level of performance or condition to be achieved within a time period

	Final Rules (FHWA – 23 CFR 490)	States Set Targets By	NCDOT Status
	PM1 – Safety (5 measures)	Aug. 31, 2017	Completed – 2018 targets established in Highway Safety Improvement Program (HSIP)
HWA	PM2 – Pavement/Bridge (6 measures)	May 20, 2018	Completed – Pending submission to FHWA, NCDOT set 2-year and/or 4-year targets
ш	PM3 – System Performance (6 measures)	May 20, 2018	Completed – Pending submission to FHWA, NCDOT set 2-year and/or 4-year targets
FTA	Transit Assets	Jan. 1, 2017	Completed – 2017 targets and Transit Asset Management Plan

PM1 - Highway Safety Performance Measures

1. Number of fatalities

- 2. Fatality rate (per 100 million VMT)
- Number of serious injuries
- Serious injury rate (per 100 million VMT)
- Number of nonmotorized fatalities and serious injuries

FY2018 targets adopted Targets set annually

PM2 – Pavement/Bridge Performance Measures

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

2019 and 2021 statewide targets set



PM3 - System Performance / Freight / CMAQ Performance Measures

- **12.** % of person miles on the <u>Interstate</u> system that are reliable
- **13.** % of person miles on the <u>non-Interstate</u> NHS that are reliable
- **14.** % of <u>Interstate</u> mileage providing for reliable truck travel times
- **15.** Annual hours of peak-hour excessive delay per capita
- Percent of non-single occupant vehicle travel
- 17. Total emissions reduction (CMAQ projects)
- 2019 and 2021 statewide targets set

Interstate Pavement Condition (Good)

PM2 Measure:

Performance Trend:

Percentage of Interstate pavement 80% Federal guidance is still being in "Good" condition: reviewed for measure/metric Total interstate lane miles in good computational analysis and 70% condition based on IRI (measure of application. NCDOT pavement smoothness), cracking completing transition to full percent, and rutting or faulting. All extent data collection to 60% condition metrics must exhibit good support IRI elemental data to classify pavement as good. review. Interstate Pavement Condition (Good) 50% 2013 2014 2015 2016 **4-Year Target** (1/1/2018 - 12/31/2021)% of Interstate 37.0% pavement in Good condition Understand measure definition and underlying Will review progress and can adjust target at Approach data (including data collection methods). mid-point of first 4-year performance period Address (2020, based on 2018 and 2019 performance). • Evaluate trend, external factors, and internal factors impacting future 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. <u>Accountable</u> Assumptions Funding stability Pavement Management Unit, Division of Highways •State-driven targets, not Federal budget allocations •Note, the actual 2-year condition (2018 and 2019) will become the baseline condition for • Overall Interstate VMT growth and truck VMT the first performance period for this measure. growth • Maintain balance, levels of percent good v. fair

Interstate Pavement Condition (Poor)

PM2 Measure:

Performance Trend:

Percentage of Interstate pavement Target set below minimum 5% federal threshold for "poor" in "Poor" condition: -O-Interstate Pavement Condition (Poor) 1.0% Total interstate lane miles in poor condition. Federal guidance is still being reviewed for condition based on IRI (measure of measure/metric pavement smoothness), cracking 0.5% computational analysis and percent, and rutting or faulting. If 0.06 0.00 application. NCDOT one condition metric exhibits poor, completing transition to full the segment is classified as poor extent data collection to pavement. 0.0% support IRI elemental data 2013 2014 2015 2016 review. **4-Year Target** (1/1/2018 - 12/31/2021)% of Interstate pavement in 2.2% Poor condition Understand measure definition and underlying Will review progress and can adjust target at Approach data (including data collection methods). mid-point of first 4-year performance period Address (2020, based on 2018 and 2019 performance). • Evaluate trend, external factors, and internal factors impacting future 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. Accountable Assumptions Funding stability Pavement Management Unit, Division of Highways •State-driven targets, not Federal budget allocations •Federal threshold (minimum): If more than 5% of Interstate pavement is rated in Poor • Overall Interstate VMT growth and truck VMT condition for any year, the State must obligate growth NHPP funds and transfer STP funds to improve •Maintain balance, levels of percent good v. poor pavement.



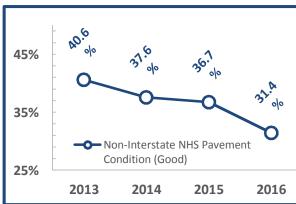


Non-Interstate NHS Pavement Condition (Good)

PM2 Measure:

Performance Trend:

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.



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).

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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

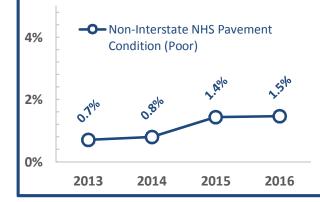
Approach	 Understand measure definition and underlying data (including data collection methods). Evaluate trend, external factors, and internal factors impacting future performance. 	Address	 Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 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 Difficult to keep good facilities "good" and to accurately track Timing and gaps of data collection and reporting 	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.
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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).

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2-Year Target (1/1/2018 – 12/31/2019)



(1/1/2018 – 12/31/2021)

4-Year Target

4.2% % of non-Interstate NHS pavement in Poor condition



% 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.

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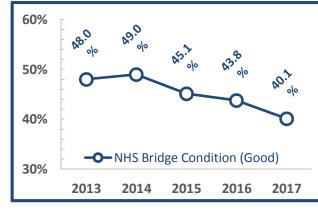
NHS Bridge Condition (Good)

PM2 Measure:

Performance Trend:

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.



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).	ess	•Will review progress and can adjust target at mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance).
bro	 Evaluated trend, external factors, and internal factors impacting future performance. 	Address	 The first performance period - January 1st, 2018 through December 31st, 2021
Ap	 Includes all NHS bridges and culverts over 20 ft. in length. 	A	
ssumptions	 NCDOT responsible for the collection of all bridge condition data necessary to set targets. 	scountable	 Structures Management Unit, Division of Highways
Б Е	 Targets consistent with findings of Transportation Asset Management Plan (TAMP) 	nut	 Takes into account the number of NHS bridge replacements expected over next 10 years.
Assu	analysis and evaluation of bridges consistent with Federal measure.	Acco	•No minimum threshold requirement.
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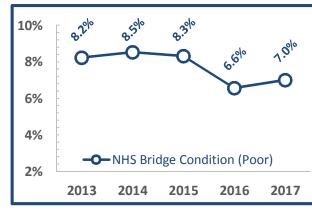
NHS Bridge Condition (Poor)

PM2 Measure:

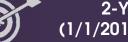
Performance Trend:

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.



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.



8.0%

Approach

Assumptions

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

% of NHS bridges by deck

area in Poor condition

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

9.0%

Address

<u>Accountable</u>

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% of NHS bridges by deck area in Poor condition

 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.

 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 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

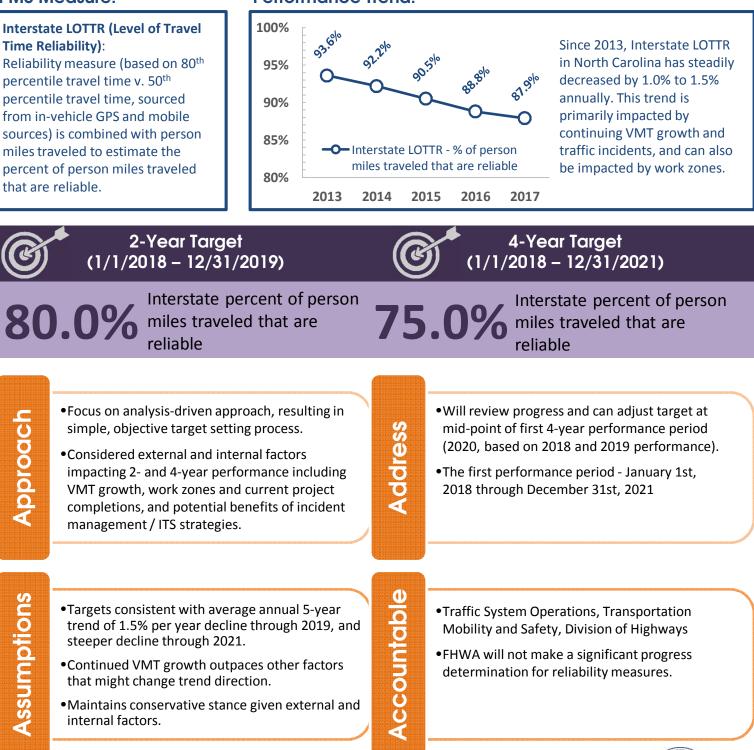
- Structures Management Unit, Division of Highways
- •Federal threshold (minimum): If more than 10% of NHS bridge deck area is rated in Poor condition for three consecutive years, the State must obligate NHPP funds for eligible bridge projects on the NHS.



Interstate Travel Time Reliability

PM3 Measure:

Performance Trend:



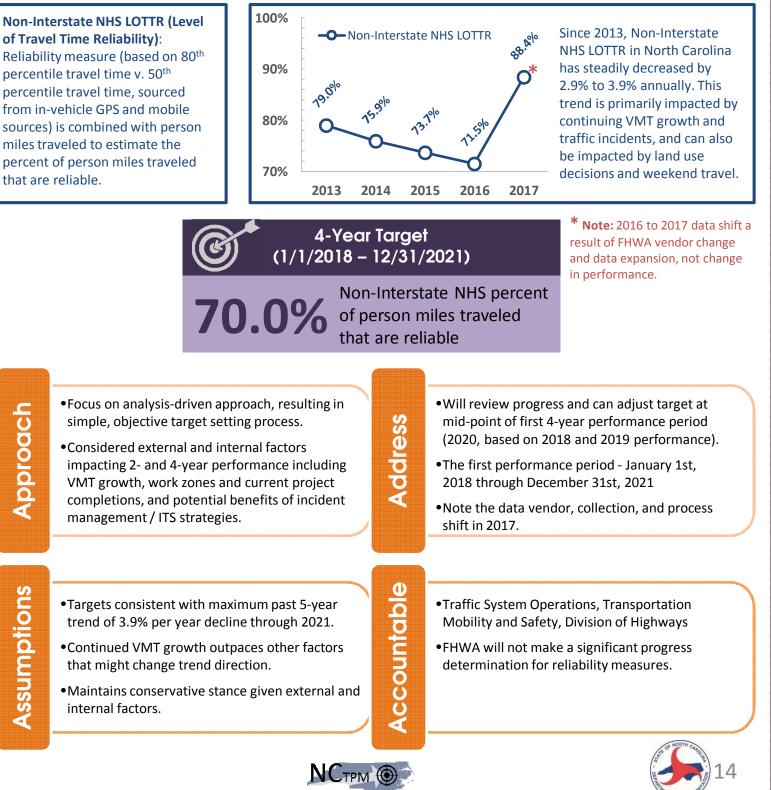




Non-Interstate NHS Travel Time Reliability

PM3 Measure:

Performance Trend:



Truck Travel Time Reliability (Interstate)

PM3 Measure:

Performance Trend:

Since 2013, Interstate TTTR in Interstate TTTR (Truck Travel Time 1.70 North Carolina has steadily **Reliability)**: increased by 1.7% annually. Reliability measure based on the This trend is primarily worst 95th percentile truck travel impacted by continuing truck time v. 50th percentile truck travel 1.50 time, sourced from in-vehicle GPS VMT growth and traffic incidents, and can also be and fleet date) is averaged across -O-Interstate Truck Travel Time the length of all Interstate impacted by work zones. Reliability segments. 1.30 *2016 to 2017 data shift a result 2013 2017 2014 2015 2016 of FHWA vendor change. 2-Year Target **4-Year Target** (1/1/2018 - 12/31/2019)(1/1/2018 - 12/31/2021)**1.65** Interstate truck travel time reliability index **1.70** Interstate trues reliability index Interstate truck travel time • Focus on analysis-driven approach, resulting in Will review progress and can adjust target at Approach Address simple, objective target setting process. mid-point of first 4-year performance period (2020, based on 2018 and 2019 performance). Considered external and internal factors impacting 2- and 4-year performance including •The first performance period - January 1st, 2018 through December 31st, 2021 work zones and project completions, weigh station locations, incident management, and Increased data coverage in 2017 is primary truck volumes. driver for performance change Accountable Assumptions Targets consistent with maximum past 5-year •Traffic System Operations, Transportation trend of 3.4% per year increase through 2019 Mobility and Safety, Division of Highways and increasing trend through 2021. •FHWA will not make a significant progress • Related to decrease in LOTTR performance (TTTR determination for reliability measures. focuses on the ratio, not the percent of travel). • Maintains conservative stance given external and internal factors.

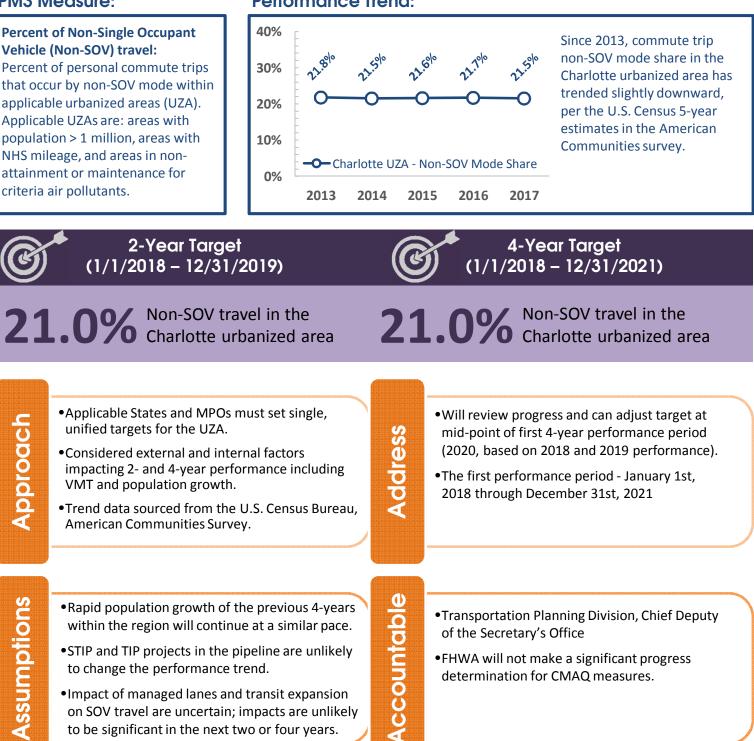
Congestion Mitigation & Air Quality – Non-SOV

PM3 Measure:

to change the performance trend.

on SOV travel are uncertain; impacts are unlikely to be significant in the next two or four years.

Performance Trend:



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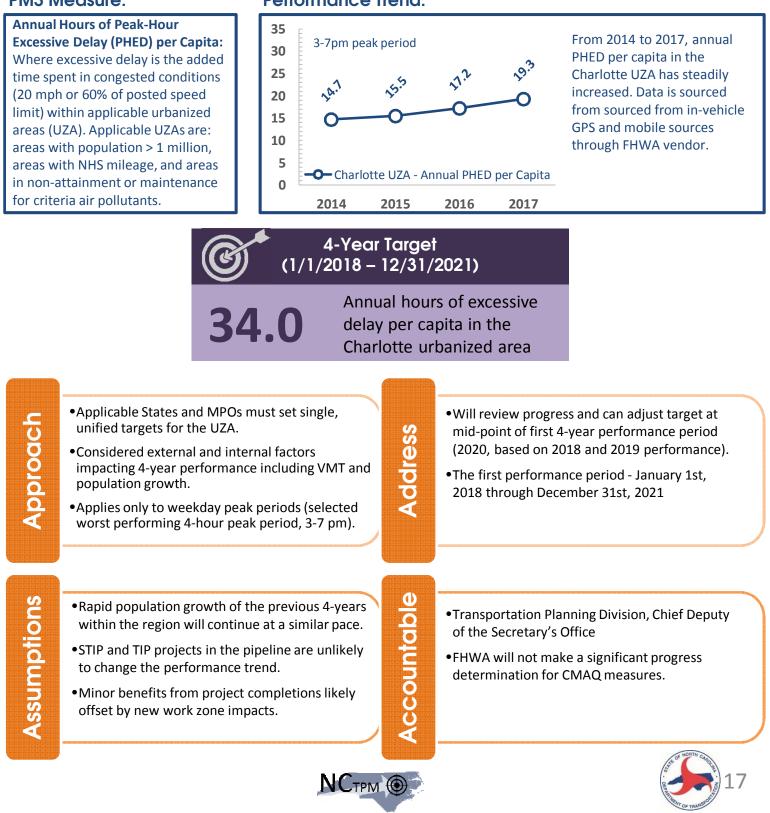
determination for CMAQ measures. •Impact of managed lanes and transit expansion



Congestion Mitigation & Air Quality – PHED

PM3 Measure:

Performance Trend:



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 nonattainment or maintenance area boundary. Individual MPO targets are summed to establish the statewide target.

Performance Trend:

2014-2017 Range (kg/day)				
Pollutant	Low	High		
СО	5.76	17.36		
VOC	0.13	2.75		
NOx	1.18	8.20		

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.



2-Year Target (1/1/2018 – 12/31/2019)

CO: 11.522 kg/day VOC: 0.252 kg/day NOx: 2.360 kg/day CO: 23.044 kg/day VOC: 0.504 kg/day NOx: 4.720 kg/day

Total emissions reduction in Charlotte maintenance area

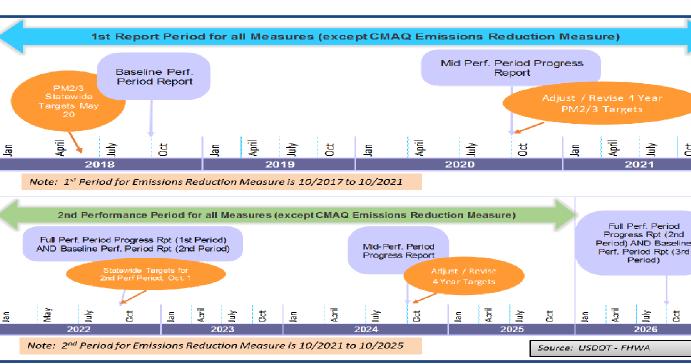
4-Year Target

(1/1/2018 - 12/31/2021)

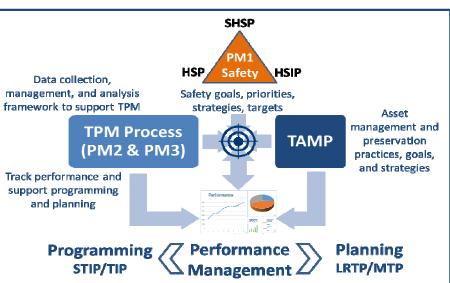
Approach	 Measures cumulative 2-year and 4-year emission reductions for CMAQ funded projects Targets are set for the portion of the State and for each MPO within the maintenance area boundary Each MPO sets its own target; the State target is the sum of the MPO targets 	Address	 Will review progress and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

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.



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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