Delaware DOT Division of Planning

Submission to FHWA Delaware Division

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# **EXECUTIVE SUMMARY**

PM 3 MEASURES:		TARGETS:
Percent of Person-Miles on the Interstate, F	Reliable	> 75%
Percent of Person-Miles on the Non-Interst	ate NHS, Reliable	> 88%
Truck Travel Time Reliability Index (TTTR)		< 2.50
Annual Hours of Peak Hour Excessive Delay	(PHED) Per Capita	2017 = 16.8 2018 = 16.9 2019 = 17.0 2020 = 17.1 2021 = 17.2
Percent of Non-Single Occupancy Vehicle (S	OV) Travel 2016 2016	2016 = 27.9% - 2018 = 28.0% - 2021 = 28.1%
Total Emission Reduction (CMAQ On-Road)	2-Year Total No VC 4-Year Total NC VC	Ox 7353.40 OC 10521.40 Ox 16086.83 OC 26229.83
NHS Pavement Conditions (2 and 4 Years)	Interstate Non-Interstate NHS Non-Interstate NHS	Good 50% Poor 2% Good: 50% Poor 2%

NHS Bridge Condition (2 and 4 Years)

Bridges	<b>Poor &lt; 5%</b>
	Good > 15%
Deck Area	<b>Poor &lt; 10%</b>

## "NPMRDS – Based PM 3 Measures"; Delaware DOT and Delaware MPO Coordination

The Performance Management 3 Final Rule had an effective date of May 20, 2017. Based on that, State DOT targets for PM 3 measures are required by May 20, 2018 (one year later). The PM 3 requirements contain four specific measures which utilize the National Performance Management Research Data Set (NPMRDS). Those four measures are:

- 1) Percent of Person-Miles on the Interstate that are Reliable.
- 2) Percent of Person-Miles on the Non-Interstate National Highway System (NHS) that are Reliable.
- 3) Truck Travel Time Reliability (TTTR).
- 4) Annual Hours of Peak Hour Excessive Delay (PHED) per Capita.

The first three of the above-listed measures utilized statewide NPMRDS data that was examined by DelDOT Planning, the state's three MPO's, with technical support from a consulting firm. The fourth measure, PHED, utilized NPMRDS data through a coordination process involving:

Delaware Valley Regional Planning Council (DVRPC) Wilmington Metropolitan Area Planning Council (WLMAPCO) Delaware DOT Pennsylvania DOT New Jersey DOT Maryland DOT

Readers are encouraged to refer to Appendix A: *"Support Data for Travel Time-Based Measures in FHWA's System Performance, Freight, and CMAQ Performance Measures Final Rule (PM 3)"*. This is a Powerpoint report presenting additional information on:

- 1) the specific criteria underlying each of the four NPMRDS-based measures,
- 2) 2) analytical procedures in RITIS,
- 3) PM 3 metrics,
- 4) calculation procedures,
- 5) historic insights by month and year observed in RITIS,
- 6) perspectives and implications of trends, and
- 7) observations on 2017 and previous year NPMRDS data as thematically presented by the RITIS analytics.

The target setting process was coordinated among state, MPO, and consultant staffs. The process included an extensive review of RITIS charts, tables, maps, and graphics developed to support the most comprehensive understanding of the NPMRDS data.

The target setting process also included discussion of the extent to which NPMRDS data and its historical trends would be indicative of future trends for support developing the required 2-Year and 4-Year PM 3 targets. Anticipated project influences such as when and where major construction projects might likely affect future year congestion levels (during maintenance of traffic), the potential multi-construction year nature of various major capital & programmed projects in Delaware (especially the I-95 reconstruction project south of Wilmington in New Castle County, the widening of US 13 south of Dover, and the various SR 1 program projects in Kent and Sussex Counties).

The purpose of that discussion was to assess the degree to which NPMRDS historical data, and estimates or projections of near term horizon years (2019 and 2021, respectively) could be examined to develop reasonable PM 3 targets – defined as performance-based targets based on data and which relate to anticipated congestion levels that are likely to be present in Delaware.

Development of the NPMRDS-based targets was supported by an assessment of potential and likely construction impacts. A travel demand model was referred to in making those assessments. RITIS trend data was overlayed with selected Capital Transportation Program projects having

notable impacts to the Interstate system, affecting multiple NHS corridors, and more than one construction year "cycle" (projects that will need more than one construction year, over the 4-Year target setting horizon).

Appendix A, pages 39 – 41 illustrate how NPMRDS data was used to develop a range of possible PM 3 targets for each of the various measures. Implications are listed – these were used to inform the multi-agency discussion so that the selected targets shown in the Executive Summary represented the best available data trends, based on how those trends may proceed over the 2-Year and 4-Year performance planning horizons.



Figure 1: Interstate Travel Time Reliability (Source: RITIS. Map by WILMAPCO).



Figure 2: Non-Interstate NHS Travel Time Reliability (Source: RITIS. Map by WILMAPCO).



Figure 3: Truck (Freight) Travel Time Reliability (Source: RITIS. Map by WILMAPCO).

## "Percent Non-Single Occupant Vehicle (Non-SOV) Travel and Annual Peak Hour Excessive Delay (PHED) Per Capita"; Philadelphia, PA-NJ-DE-MD Urbanized Area Coordination

There were four Transportation Performance Measure meetings held for the Philadelphia PA-NJ-DE-MD Urbanized Area to coordinate, discuss, and establish target setting for the annual PHED per capita and percent of Non-SOV travel measures.

Target setting was required as part of the FHWA final rule in the Federal Register (82 FR 5970) on January 18, 2017 and which became effective on May 20, 2017. The PHED and Non-SOV rule applied to urbanized areas of more than 1 million people that are in nonattainment or maintenance areas for ozone, carbon monoxide, or particulate matter.

The meeting dates occurred on:

- 1) February 16th,
- 2) March 19th,
- 3) April 9th, and
- 4) April 30th 2018.

Agency partner representation included attendees and conference call participants from: Pennsylvania DOT, New Jersey DOT, Delaware DOT, Maryland DOT, multiple FHWA Divisions representing these four states, and seven MPOs (DVRPC, NJTPA, SJTPO, WILMAPCO, LVTS, RATS and LCTCC).

The annual PHED per capita measure was calculated using the RITIS Probe Data Analytics (PDA) Suite on May 7th 2018. May 7<sup>th</sup> was chosen by the +agencies listed above as the "pencils down" date for the final calculations of measures and establishing targets.

The PHED baseline year (2017) value was 16.8 annual hours per capita and the partners are agreeing on a 4-year (2021) target of 17.2 hours per capita.

The following chart indicates how the targets were "built-up" based on the 2017 "base year data" and based on analyses and discussion of the multi-agency coordination process:

2017 Base Year Data = 16.8 hours of delay per capita (regionwide)

2018 Estimated Data = 16.8 + (16.8 \* .6%) = 16.9 PHED.

2019 Estimated Data = 16.9 + (16.9 \* .6%) = 17.0 PHED.

2020 Estimated Data = 17.0 + (17.0 \* .6%) = 17.1 PHED.

2021 Estimated Data = 17.1 + (17.1 \* .6%) = 17.2 PHED.



Figure 4: Peak Hours of Excessive Delay (PHED). (Source: RITIS. Map by WILMAPCO).

## "Percent Non-Single Occupant Vehicle (Non-SOV) Travel and Annual Peak Hour Excessive Delay (PHED) Per Capita"; Philadelphia, PA-NJ-DE-MD Urbanized Area Coordination

The Percent Non-Single Occupant Vehicle (Non-SOV) Travel measure was calculated using the U.S. Census American Community Survey 5-year estimates for the urbanized area.

The **2016 baseline value was 27.9%** and the partners listed in the multi-agency coordination for PHED agreed on 2-year (2016-18) and 4-year (2016-20) targets of **28.0% and 28.1%**, respectively.

Multi-agency discussion took place regarding several important considerations, that were resolved through cooperative assessment of individual county trends within the Philadelphia urbanized area (across multiple MPO's).

Among the considerations:

#### Policy Goals

This Congestion Mitigation and Air Quality Program performance measure needed to consider the role that single-occupant vehicles play in contributing to traffic congestion and pollutant emissions.

It was determined that the shared goals of all partner agencies reflected strong support for increasing non-single-occupant modes, including public transit, ridesharing, walking, and biking.

#### <u>Data</u>

Across the Philadelphia region (all MPO's) Non-Single Occupant Vehicle (SOV) travel included carpool, train, bus, walk, bike, taxi, rideshare, working at home, etc.; anything other than driving alone. All agencies shared this view.

\Percent Non-SOV Travel for the urbanized area was calculated using U.S. Census merican Community Survey (ACS) data 5-year estimates for journey-to-work trips for residents within the urbanized area.

While all trips (not just journey-to-work) would be ideal to track, this regularly updated, approved dataset was recognized by all agencies as the best available. This assessment was made after several agencies assessed and compared other sources of data, including regional and statewide travel surveys, private sector data sets, and other existing and potential sources.

It should be noted that the ACS data reflected five-year averages, with a time lag. The baseline referred to 2012-2016 values, the 2-year target from 2016-2018, and the 4-year target from 2016-2020.

#### <u>Trends</u>

ACS percent Non-SOV Travel data trends showed slight increases in percent non-SOV travel from 5-year ACS (2007-11) to 5-year ACS (2012-16). Several approaches were considered, but the multi-agency coordination process determined that a linear trendline could be used to establish 2- and 4-year targets.

Based on discussions it was noted that percent non-SOV is a percentage measure. Thus, theoretically if trip making continues to grow across the region, the absolute number of non-SOV trips would increase even if the percentage stayed the same.

#### **Considerations and Uncertainties in Meeting Established Targets**

There is a two-year time lag in reporting of data, so any non-SOV completed project would not be reflected in the measure until two years later. Additionally, reflected changes are incremental due to five-year averages intrinsic to this measure.

Discussion noted that the ability of the existing public transit system (even with currently planned improvement projects) to accommodate increased ridership is limited, and the expansion of the transit network is commensurately limited over the 4-Year target time frame.

Discussion noted that continued increases in ridesharing, transportation network companies (TNCs), walking, and biking would contribute to increases in this particular measure.

Land use, housing locations, and work locations would continue to affect tripmaking and the use of non-SOV modes.

Changes in pricing (e.g. tolls, fuel costs and transit fares) could affect this measure.

#### **Approach**

Based on these considerations, the Philadelphia Urbanized Area MPOs and State DOT partners agreed that there would be a slight increase in targets from the baseline, with an appropriate 2-year target (2016-18) and 4-year target (2016-20) at 28.0% and 28.1%, respectively.

## "On-Road Mobile Source Emission Reductions, CMAQ PM 3 Measure"; Delaware DOT and Delaware MPO Coordination

Subpart H referred to "Emission Reductions Measures" requiring 2-Year and 4-Year for each applicable criteria pollutant and precursor. This was a separate, distinct PM 3 measure compared with the "regional measures" contained in Subpart G (the PHED and Non-SOV Travel Measures previously described).

The technical process used to develop the emission reductions corresponding to the CMAQ-funded projects in Delaware was as follows:

- 1) A spreadsheet was developed by DelDOT Finance Division staff describing CMAQ expenditures, project titles, project descriptions, and funding amounts for State FY 2017, FY 2018, FY 2019, FY 2020, and FY 2021.
- 2) For "out years" in the above spreadsheet (FY 2019 FY 2021) a list of currently planned projects for the ""Bike/Pedestrian" category was developed by DelDOT Division of Planning, Local Systems staff. This was used to supplement the Finance spreadsheet so that project locations, project lengths, and potential usage estimates could be developed.
- 3) An assessment was made to determine if "qualitative" or "quantitative" methods could be used to estimate emission reductions, and amounts, according to grams per day, kilograms per day, or tons per year.
- 4) For those projects that were assessed as able to utilize "quantitative" methods, a further assessment was made to use:
  - A) staff spreadsheet tools or
  - B) the FHWA "CMAQ Emissions Calculator Toolkits".
- 5) Emissions estimates were then developed to support development of targets, based on likely or potential reductions.

Considerations:

In developing the emissions reductions estimates, it was obvious that the allocation of CMAQ funds according to currently programmed projects could change (may likely change) as updates occur in the future. This might happen due to updating completion dates of currently underway projects, evolving priorities or recognition of updated prioritization factors and criteria (resulting in some projects currently programmed for CMAQ funds in "out years" potentially receiving more or less total CMAQ funds, adjustments to project horizon years and completion dates, and other element within the project planning, design, and construction processes.

The Total Emission Reduction for the current list of CMAQ-funded projects in Delaware (able to be assessed through quantitative methods) are as follows:

- The 2-Year Total Emissions reductions of NOx are 7353.40 grams per day. The 2-Year Total Emissions reductions of VOC are 10521.40 grams per day.
- 2) The 4-Year Total Emissions reductions for NOx are 16086.83 grams per day. The 4-Year Total Emissions reductions for VOC are 26229.83 grams per day. Note that the 4-Year Emissions reductions include the estimated amounts for the previous 2-Year targets as well.

## "NHS Pavement Conditions PM 3 Measure"; Delaware DOT and Delaware MPO Coordination

The PM 3 requirements for Pavements include:

- 1) Percentage of Interstate pavements in Good condition.
- 2) Percentage of Interstate pavements in Poor condition.
- 3) Percentage of non-Interstate pavements in Good condition.
- 4) Percentage of non-Interstate pavements in Poor condition.

The data used to develop these performance measures was the "2017 Delaware State Condition Data, collected between the Fall of 2016 and the Spring of 2017.

DelDOT contracted with a vendor to collect roadway distress data using highway speed collection technologies which included laser crack mapping, IRI collection, and faulting data. The vendor collected a variety of distresses for use in the State's condition inventory which included acquiring necessary HPMS data and the new FHWA highway reporting metrics. The data was then analyzed and processed into the specific metrics needed for the FHWA reporting.

DelDOT collected pavement condition data in order to report the metrics listed in CFR 490.307, the "National Performance Measures" for assessing pavement conditions. The data was collected according to 23 CFR 490.309 (Data Requirements) and analyzed according to 23 CFR 490.311 (Calculation of Pavement Metrics) and 23 CFR 490.313 (Calculation of Performance Management Measures).

DelDOT Pavement Management staff chose the targets shown in the Executive Summary because they were close to existing conditions as they stand now. No significant changes (either improving or declining) to existing pavement conditions statewide are anticipated in the 2-Year and 4-Year horizon periods. The targets chosen are still not the maximum Poor percentages allowed by FHWA (5%) so the targets reflect a conservative approach to estimating statewide pavement conditions.

Overall, the targets chosen represent a "middle ground" approach until DelDOT's Pavement Management Section completes development and testing of a pavement performance (deterioration rate) model. That set of tools will be able to forecast the condition of NHS roadway pavements according to FHWA metrics taking into consideration past and future rehabilitation and preservation work. The process will assist DelDOT Pavement Management Section evaluate if refinement to the 4-Year targets might be needed.

Factors and considerations used in setting Pavement condition targets included:

- 1) Delaware has a relatively small percentage of its NHS system as Interstate highways.
- 2) Some of that Interstate system (I-295) is not under Delaware DOT maintenance control but still counts toward DelDOT's pavement condition totals.
- Any construction work or Poor or Failing pavements on I-295 can have a disproportionate impact on pavement condition percentages for Delaware Interstates.



Figure 5: Delaware NHS Pavement Conditions. (Source: DelDOT Pavements Section & Pavement Data. Map by DelDOT Planning).

## "NHS Bridge Conditions PM 3 Measure"; Delaware DOT and Delaware MPO Coordination

The PM 3 requirements for Bridges include:

- 1) NHS Bridges in Good condition.
- 2) NHS Bridges in Poor condition.
- 3) NHS Deck Area in Poor condition.

All bridges in Delaware are inspected at a minimum biennially per 23 CFR 650, Subpart C – National Bridge Inspection Standards (NMIS). This includes what is defined as a "bridge" and the definitions of the condition ratings.

Additionally, it should be noted that condition rating categories for performance management assessments were defined in the PM 2 regulation.

Delaware's annual bridge inspection data is submitted to FHWA Delaware Division by March 31 of each year. Condition ratings may change at each bridge location as each inspection is conducted and completed.

Delaware DOT's Bridge Management Section has had a process for over 15 years through which a statewide "target" of less than 5% of total system bridges could be defined as "Poor" condition. Furthermore, MAP-21 required State's to have targets of <= 10% of total deck area defined as "Poor" condition.

FHWA's categories of "Good/Fair/Poor" are measured somewhat differently than how DelDOT has traditionally categorized bridges. It is difficult to assess how variations in those percentages may fluctuate. DelDOT's previous measure was >75% Good (NBI >= 6) but FHWA changed the definition of Good to be >=7 which significantly affected Delaware's (and many states) bridge condition ratings. In addition, other recent changes by FHWA regarding inspections (now element level) have also led to a potential for uncertainty in how these measures might fluctuate in the near future.

As such, the current condition ratings were emphasized in the development of 2-Year and 4-Year condition targets.

Bridge condition targets for both 2 and 4-Year horizons are as follows:

Number of Bridges:

Poor (NBI <= 4) = < 5% Good (NBI >= 7) = > 15%

Deck Area:

Poor (NBI <= 4) = < 10%



Figure 6: Delaware NHS Bridge Conditions. (Source: DelDOT Bridge Management Section, NBI Data. Map by DelDOT Planning).

## **Coordination:**

Meetings were held at DelDOT to:

- 1) coordinate the collection of NPMRDS data,
- 2) to assess its trends,
- 3) to discuss potential targets for each PM 3 measure, and
- 4) to select final targets for each PM 3 measure illustrated in the Executive Summary.

The meetings were held in:

October 2017 February 2018 March 2018 April 2018

These meetings were attended by staff and management of:

DelDOT Planning, Regional Systems DelDOT Planning, Decision Data Systems DelDOT Finance DelDOT Bridge Management Section DelDOT Pavement Management Section DelDOT Division of Performance Management WILMAPCO Dover/Kent MPO WRA, LLP (engineering consulting firm advising on NPMRDS) FHWA Delaware Division

In addition, DelDOT Planning and WILMAPCO staff attended an FHWA PM 3 training event in Boston, MS in early Fall, 2017.

Presentations on NPMRDS, CMAQ, and the Bridge & Pavement PM 3 measures have been held at WILMAPCO and Dover/Kent MPO TAC and Council meetings.

Presentations will be conducted at the Salisbury/Wicomico MPO in early Summer, 2018. MPO staff attended some of the meetings listed previously by conference call.