

Performance-Based Planning and Programming (PBPP)

Background

The Moving Ahead for Progress in the 21st Century Act (MAP-21) and subsequent Fixing America's Surface Transportation (FAST) Act require State DOTs, Transit Operators, and MPOs to establish and use a performance-based approach to transportation decision making. This includes tracking performance measures, setting data-driven targets for each measure, and selecting projects to help meet those targets. The FAST Act also requires that the TIP include a description of its anticipated effect toward achieving the established performance targets, linking investment priorities to those performance targets. This section describes both highway and transit approaches to Performance-Based Planning and Programming (PBPP) in the DVRPC region. The goal of PBPP is to ensure targeted investment of federal transportation funds by increasing accountability and transparency and providing for better investment decisions that focus on key outcomes.

The regulations required by FHWA are related to seven national goals:

- Safety
- Infrastructure preservation
- Congestion reduction
- System reliability
- Freight movement and economic vitality
- Environmental sustainability
- Reduced project delivery delays

Regulations required by FHWA have established final rules on performance measures that address the seven goals, accordingly:

- Fatalities and serious injuries, both number and rate per vehicle miles traveled, on all public roads
- Pavement condition on the Interstate system and on the remainder of the National Highway System (NHS)
- Performance (system reliability) of the Interstate system and the remainder of the NHS bridge condition on the NHS
- Bridge condition on the NHS
- Traffic congestion
- Freight movement on the Interstate system
- On-road mobile source emissions

The regulations required by FTA have established a strategic and systematic process of operating, maintaining, and improving public capital assets effectively through their life cycle. The performance management requirements are a minimum standard for transit operators and involve measuring and monitoring the following:

- Transit safety
- Transit rolling stock
- Transit equipment
- Transit infrastructure
- Transit facilities

For more information about the development and implementation of Transportation Performance Management (TPM) policy and rulemaking, see www.fhwa.dot.gov/tpm for Highway and www.transit.dot.gov/performance-based-planning for Transit. For the TPM implementation timeline for all performance measures, see www.fhwa.dot.gov/tpm/rule/timeline.pdf for Highway and www.transit.dot.gov/regulations-and-guidance/transportation-planning/timeframes-performance-based-planning for Transit.

Highway Safety Performance Management Measures Rule (PM1)

Highway Safety is the first national goal identified in the FAST Act and had the earliest deadline for addressing progress towards meeting targets in the Transportation Improvement Program. For more information about the development and implementation of FHWA’s Transportation Performance Management (TPM) policy and rulemaking, see www.fhwa.dot.gov/tpm. For the TPM implementation timeline for all performance measures, see www.fhwa.dot.gov/tpm/rule/timeline.pdf.

In March 2016, the FHWA Highway Safety Improvement Program and Safety Performance Management Measures Rule (Safety PM Rule) was finalized and published in the Federal Register. The rule requires State DOTs and MPOs to set annual targets for five safety-related performance measures with the understanding that reaching zero fatalities on all public roads will require time and significant effort. A target is defined in 23 CFR 490.101 as a quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by FHWA. The federal safety performance measures are consecutive five-year rolling averages for:

- Number of fatalities
- Rate of fatalities per 100 million vehicle miles traveled (VMT)
- Number of serious injuries
- Rate of Serious Injuries per 100 million VMT
- Number of non-motorized fatalities and non-motorized serious injuries (combined)

State DOTs report baseline values, targets, and progress toward meeting the targets to FHWA in an annual safety report. MPOs may either establish quantitative targets for their metropolitan planning area, or agree to adopt the statewide targets. FHWA requires DOTs and MPOs to establish safety targets on an annual basis, beginning with targets for calendar year (CY) 2018. The DVRPC Board adopted a resolution on January 25, 2018 supporting PennDOT’s statewide safety targets for CY 2018. Subsequent resolutions were adopted supporting statewide safety targets for CY 2019 on January 25, 2019, and CY 2020 on January 23, 2020.

FHWA will determine whether a State has met or made significant progress toward its safety performance targets. A State is considered to have met or made significant progress when at least four out of the five safety performance targets are met or the actual outcome for the safety performance target is better than baseline performance. Unfortunately, for CY 2018, Pennsylvania did not meet or make significant progress towards its safety performance targets on three out of five performance measures: Number of Serious Injuries, Rate of Serious Injuries, and Number of Non-Motorized Fatalities and Serious Injuries. PennDOT is

now required to submit an HSIP Implementation Plan. This plan was delivered to FHWA by the June 30, 2020 deadline. PennDOT is also required to use obligation authority equal to the HSIP apportionment for FY2018, which is \$97,585,000, for safety projects in the upcoming fiscal year.

PennDOT Statewide Highway Safety Targets and Goals

PennDOT published its most recent Strategic Highway Safety Plan (SHSP) in early 2017. The 2017 SHSP was developed in conjunction with over 45 stakeholders including federal, state, and local agencies, and private sector organizations, and Pennsylvania’s Metropolitan Planning Organizations (MPO)/Rural Planning Organizations (RPO), coordinating together to address the four E’s of the safety discipline (Engineering, Enforcement, Education, and Emergency Response). This document adopted a goal to support the national vision for highway safety – Toward Zero Deaths: A National Strategy on Highway Safety.

The goals outlined in PennDOT’s 2017 SHSP were used to help define targets for the Safety PM Rule. Specifically, the 2017 SHSP set a goal of reducing fatalities and serious injuries on PennDOT roadways by two percent per year. The following table details PennDOT’s statewide safety targets for CY2020:

Table 10: Pennsylvania Statewide Safety Targets

| Performance Measure | 5-Year Rolling Averages | |
|---|-------------------------|-----------|
| | Baseline | Target |
| | 2014-2018 | 2016-2020 |
| Number of Fatalities | 1,182 | 1,171.9 |
| Fatality Rate | 1.169 | 1.148 |
| Number of Serious Injuries | 3,839.6 | 4,400.3 |
| Serious Injury Rate | 3.797 | 4.309 |
| Number of Non-motorized Fatalities and Serious Injuries | 679 | 781.7 |

Source: PennDOT

As previously stated, PennDOT’s 2017 SHSP set a goal of reducing fatalities and serious injuries on PennDOT roadways by two percent per year. However, this reduction may not be readily apparent in the table because of the specific calculation required for the baseline and target numbers. Using a 5-year average and projected numbers in the target calculation, as required, can result in a higher target number than baseline number. For example, the higher target number for the serious injury calculation is a direct result of the fact that in 2016, Pennsylvania’s definition of a serious injury changed to include many injuries not previously counted as serious. This increased the 2016 serious injury number significantly. The 5-year average baseline calculation uses this higher 2016 number once (for one year) as part of calculating the average. For the target calculation, even while projecting a two percent reduction in 2017 and 2018, the calculation uses higher numbers for three of the five years in calculating the average (due to the definition change), resulting in a higher target than baseline number. The same principle applies to the baseline and target calculations of the non-motorized fatalities and serious-injuries.

Coordination on Highway Safety Target Setting

Coordinated efforts between PennDOT, MPOs, RPOs, and other partners in Pennsylvania to establish the Safety PM Targets began in April 2016 with a Statewide Safety Summit and continued when staff from PennDOT and Pennsylvania's MPO/RPOs participated in a FHWA Target Setting Peer Exchange in May 2016. To strengthen communication and coordination efforts, a Safety Planning Workgroup with representation from both technical safety experts and planning staff was established to meet regularly and discuss safety topics including Performance Measure Targets and Goals. The workgroup's discussions were shared at annual Statewide Planning Partners Meetings and via bi-monthly conference calls. In January 2018, DVRPC took formal action to adopt the same set of safety targets as the state. Subsequent to the adoption, DVRPC submitted a check-off letter to PennDOT, in place of written procedures of collaboration, agreeing to support the state targets by planning and programming projects that contribute to meeting or making significant progress toward the established PennDOT safety targets. Subsequent resolutions were adopted supporting statewide safety targets for CY 2019 on January 25, 2019, and CY 2020 on January 23, 2020.

Progress Toward Highway Safety Targets

The DVRPC 2021 TIP for PA was developed to ensure progress toward target achievement. The following steps have been taken at the statewide and regional levels to ensure that projects selected for HSIP funding in Pennsylvania help to achieve a significant reduction of traffic fatalities and serious injuries on all public roads to support achieving safety targets:

- Pennsylvania sets aside \$35 million of HSIP funds per Federal Fiscal Year (FFY) to advance projects that are evaluated and ranked based on Benefit/Cost analysis, Highway Safety Manual (HSM) analysis, fatal and injury crashes, application of systemic improvements, improvements on local roads, and deliverability. This program is referred to as the Statewide HSIP Set-Aside Program (sHSIP), and applications for funding are solicited across the Commonwealth. DVRPC and PennDOT District 6 staff work together to develop and identify projects to seek this funding. Those that have been awarded funding through this program are identified as "Statewide" in Table 11:.
- In addition to advancing projects awarded through the Statewide HSIP Set-Aside Program, the DVRPC region is allocated close to \$18 million of HSIP funds annually as part of the State's Financial Guidance. DVRPC and PennDOT District 6 staff work together to develop and identify safety projects to utilize these additional HSIP funds. Potential projects are evaluated based on Benefit/Cost and HSM analysis, in the same way described above for the Statewide HSIP Set-Aside Program. These projects are noted as "Regional" in Table 11:.
- At the statewide and regional levels, PennDOT works to implement strategies identified in the 2017 SHSP through data driven safety analysis, including low-cost systemic safety improvements.
- PennDOT Central Office opened the HSIP funding site in SharePoint in January 2017 and it is still utilized to this day. The HSIP funding site provides a single point of communication for all HSIP project eligibility and funding requests. Project applications are reviewed through an approval workflow involving District and Central Office safety and planning staff, and all MPOs and RPOs are also able to coordinate and communicate through the SharePoint system.
- Projects are being planned and completed that were associated with the Intersection Safety Implementation Plan and Roadway Departure Safety Implementation Plan.
- Pennsylvania is moving toward using the PA Regionalized Safety Performance Functions (SPFs) developed for a statewide network screening of about 20,000 locations. These new evaluations will use the Highway Safety Manual (HSM)'s analysis method of Excess Expected Average Crash Frequency with Empirical Bayes (EB) adjustments also known as Potential for Safety Improvement (PSI). This method will use the calculated expected crashes for a location and subtract the Predicted

crashes for that same location to produce an excess (or PSI) value. The new regionalized SPFs have been added to a Pennsylvania specific HSM analytical tool.

The expectation is that through a continued focus on implementing safety improvements, PennDOT's and DVRPC's safety performance measure targets will reduce the numbers of fatalities, serious injuries, and non-motorized fatalities in Pennsylvania. The DVRPC FY2021 TIP for PA includes 48 projects totaling over \$120.4 million for selected projects utilizing federal HSIP funds.

Additionally, DVRPC has established a set of criteria used to evaluate new projects that are added to the TIP. The criteria were developed with New Jersey and Pennsylvania members of a working subcommittee of the DVRPC Regional Technical Committee (RTC) and were designed to align directly with the multimodal goals of the Connections 2045 Plan and to reflect the increasingly multimodal nature of projects in the TIP. After defining the criteria, the working subcommittee weighted them, with higher weights equaling higher priorities for the DVRPC region.

Safety was rated as the highest priority for project evaluation. Each project is evaluated for how it impacts safety-critical elements for transit projects, high-crash road locations, or incorporates one or more FHWA proven safety countermeasures. Many other TIP projects funded with non-HSIP funds will provide safety benefits to the roadway system. Resurfacing, guiderail and vegetation maintenance, and bridge improvement projects are all expected to provide safety improvements and should help to bring fatality and serious injury crashes down.

Table 11: Projects Utilizing Federal Highway Safety Improvement Program (HSIP) Funds

| County | Project | Description | HSM Benefit/Cost | Funding Status |
|---------|--|---|------------------|-------------------|
| Bucks | Old Lincoln Hwy. (SR 2037) and Hulmeville Ave. (SR 2047) Safety Improvements | Adding exclusive left-turn lanes, modifying left-turn signal phasing, increase all-red clearance interval | 2.51 | Ongoing Statewide |
| | Roundabout on Easton Rd. at New Britain Rd./Sauerman Rd. | Roundabout installation at Easton Rd. and New Britain Rd. as well as Easton Rd. and Sauerman Rd. | 1.28 | |
| | Route 113 and Minsi Trail Rd. Roundabout | Roundabout at Souderton Rd. and Minsi Trail Rd. | 5.08 | New Regional |
| | Buckingham Rd and York Rd. (PA 263) Roundabout | Roundabout at Buckingham Road and York Road | 1.31 | |
| | Penndell Borough Intersection Improvements | Road diet, add left-turn lanes, upgrade pavement markings, high visibility crosswalks, signals | 2.56 | |
| Chester | Horseshoe Pk. at Manor Rd. | Installation of left turn lanes | 6.37 | Ongoing Statewide |
| | PA 10 Shoulder Widening | Shoulder widening | 5.95 | |
| | Manor Rd. at Cedar Knoll/Reeceville Rd. | Roundabout installation | 2.96 | |
| | SR 896 Safety Improvement | Increase the lane and shoulder width; install signage; raised pavement markers, rumble strips | N/A ¹ | Ongoing Regional |
| | West Chester Pike Safety Improvements | Install chevrons, curve warning, , retroreflective back plates, of right-in/right-out access | 9.46 | New Regional |
| | Route 23 Corridor Safety Improvements | Install retroreflective back plates, pedestrian countdown timers and pushbuttons, install new signal, eliminate passing lane | 17.13 | |
| | US 322 West Chester Bypass Safety Improvements | Remove passing lane, extend acceleration/deceleration lanes, install bike shoulders, centerline rumble strips, left-turn lanes, wrong-way countermeasures | 3.93 | |
| | High Street Pedestrian Improvements | Install retroreflective back plates, pedestrian countdown timers, signals and lighting | 7.51 | |

Source: DVRPC 2020

¹ This project was initiated before the current HSM Benefit/Cost analysis procedures were established for Pennsylvania's HSIP funding.

Table 11: Projects Utilizing Federal Highway Safety Improvement Program (HSIP) Funds (cont.)

| County | Project | Description | HSM Benefit/Cost | Funding Status |
|--|--|--|------------------|-------------------|
| Delaware | MacDade Blvd. Corridor from Fairview to Ashland | Road diet; addition of turn lanes; modernization of signals along corridor with fiber optic interconnection | 6.59 | Ongoing Statewide |
| | Marshall Rd. Corridor Safety Improvements | Road diet; addition of turn lanes; increase pavement friction within road diet limits; modernize signals along corridor including fiber optic interconnection | 2.56 | |
| | Bethel Rd. Roundabout | Roundabout installation at Bethel Rd. and Mill Rd. | 1.65 | |
| | Chichester Ave. Corridor Safety Improvements | Traffic signal installation; modify left turn signal phases | 1.55 | Ongoing Regional |
| | Lansdowne Ave. Corridor Safety Improvements (MPMS #111167) | Road diet; 2-way left turn lanes; left turn lanes at 8 intersections; modify left turn phasing; dynamic signal warning flashers; actuated advance warning dilemma zone protection system; modernize signals along corridor including fiber optic interconnection | 5.72 | |
| | Smithbridge Road Corridor | Roundabout installation | N/A ² | |
| | Haverford Rd. Corridor Safety Improvements | Installation of road diet, left-turn lanes, actuated advanced warning dilemma zone protection system | 8.54 | |
| Lansdown Ave Corridor Safety Improvements (MPMS #115427) | Installation of retroreflective back plates, pedestrian countdown timers, additional lighting, and raised and high visibility crosswalks | 15.23 | New Regional | |

Source: DVRPC 2020

² This project was initiated before the current HSM Benefit/Cost analysis procedures were established for Pennsylvania’s HSIP funding.

Table 11: Projects Utilizing Federal Highway Safety Improvement Program (HSIP) Funds (cont.)

| County | Project | Description | HSM Benefit/Cost | Funding Status |
|--------------|---|--|------------------|-------------------|
| Montgomery | Roundabout at Old Skippack Rd. and Schwenksville Rd. | Roundabout installation at Old Skippack Rd. and Schwenksville Rd. | 3.27 | Ongoing Statewide |
| | Main St. Corridor Safety Improvements | Turn lane and signal modifications along corridor; relocate roadside fixed objects along corridor | 2.1 | |
| | Bethlehem Pike Safety Improvements | Install partial road diet, left-turn lanes, pedestrian countdown timers and retroreflective back plates | 15.16 | New Statewide |
| | Lancaster Ave and Remington Rd. Intersection Improvements | Add left-turn lanes, install pedestrian countdown timers, add ADA ramps, upgrade existing mast arm and add additional primary signal head | 5.27 | |
| | Wynnewood Rd. Road Diet | Installation of a road diet, eliminates one conflicting through movement for left turns, left-turn lanes, retroreflective signing and pavement markings, improve signal coordination | 3.40 | |
| | Sumneytown Pike Intersection Improvements | Install left-turn lanes, remove skew angle of road, install intersection lighting | 3.33 | New Regional |
| | Belmont Ave and St. Asaphs Rd. Roundabout | Installation of a roundabout | 2.00 | |
| Philadelphia | Rising Sun Ave. Signal Improvements | Improve signing and pavement markings; improve traffic signal equipment including pedestrian countdowns; traffic calming measures | 11.08 | Ongoing Statewide |
| | Frankford Ave. Signal Improvements | Improve signing and pavement markings; improve traffic signal equipment including pedestrian countdowns; traffic calming measures | 6.93 | |

Source: DVRPC 2020

Table 11: Projects Utilizing Federal Highway Safety Improvement Program (HSIP) Funds (cont.)

| County | Project | Description | HSM Benefit/Cost | Funding Status |
|--------------|--|--|------------------|-------------------|
| Philadelphia | Roosevelt Blvd. IHSDM Study | Interactive Highway Safety Design Model Study of Roosevelt Blvd. at two different locations that represent whole corridor | N/A ³ | New Statewide |
| | Roundabout at Castor Ave. and Wyoming Ave. | Roundabout installation at Castor Ave. and Wyoming Ave. | 3.64 | Ongoing Statewide |
| | Castor Ave. Corridor Safety Improvements | Road diet; modify left turn signal phasing; left turn lane at 13 intersections | 9.27 | Ongoing Regional |
| | University Ave. and I-76 Off Ramp Intersection Safety Improvements | Eliminate I-76 EB off ramp yield movement/realign ramp; widen I-76 EB off ramp to provide right turn lanes to NB University Ave.; provide signal-protected crossing of all ramp lanes for pedestrians and bicyclists | 1.21 | Ongoing Regional |
| | Henry Ave. Corridor Safety Improvement, Phase 1 | Install pedestrian signals at all locations; install centerline rumble strips where appropriate; perform selective tree removal; install reflective pavement markers | N/A ⁴ | |
| | Henry Ave. Corridor Safety Improvement, Phase 2 | Install pedestrian signals at all locations; install centerline rumble strips where appropriate; perform selective tree removal; install reflective pavement markers | N/A ⁵ | |
| | Broad St Corridor Safety Improvements | Replacement of two-way left-turn lane with raised concrete medians | 26.70 | New Regional |
| | Verree Rd. Corridor Safety Improvements | Conversion of signals from pedestal-mounted to mast arm, addition of pedestrian countdown timers and push buttons, coordination of arterial signals | 19.86 | |

Source: DVRPC 2020

³ This is the HSM analysis for the proposed alternatives and will be part of decision matrix to compare alternatives.

⁴ This project was initiated before the current HSM Benefit/Cost analysis procedures were established for Pennsylvania's HSIP funding.

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Table 11: Projects Utilizing Federal Highway Safety Improvement Program (HSIP) Funds (cont.)

| County | Project | Description | HSM Benefit/Cost | Funding Status |
|--------------|--|---|------------------|----------------|
| Philadelphia | Welsh Rd. Corridor Safety Improvements | Installation of road diet, left-turn lanes, pedestrian countdown timers, coordination of signals, and installation of retroreflective back plates | 12.29 | New Regional |
| | Frankford Ave. Corridor Safety Improvements | Conversion of signals from pedestal-mounted to mast arm, addition of pedestrian countdown timers, installation of retroreflective back plates, upgrade signal cabinet, coordination of arterial signals | 14.44 | |
| | 63 rd St Corridor Safety Improvements | Make pavement marking visible, update left-turn phasing and vehicle and pedestrian timings, install single-lane roundabout | 8.60 | |
| | Washington Lane Corridor Safety Improvements | Installation of retroreflective back plates, pedestrian countdown timers, signal coordination, convert signals from pedestal to mast-arm, install curb bump outs, raised crosswalk and flashing beacons | 14.35 | |
| | Vine St. Corridor Safety Improvements | Installation of road diet, curb protected bike lane, remove on-street parking, and update signal equipment | 1.76 | |
| | Wyoming Ave. Corridor Safety Improvements | Convert signals from pedestal-mounted to mast arm, provide flashing beacons at un-signalized intersections | 9.78 | |
| | 5 th St Corridor Safety Improvements | Convert all signals from pedestal-mounted to mast arm and install pedestrian countdown timers | 17.44 | |

Source: DVRPC 2020

Table 11: Projects Utilizing Federal Highway Safety Improvement Program (HSIP) Funds (cont.)

| County | Project | Description | HSM Benefit/Cost | Funding Status |
|-------------|------------------------|---|------------------|----------------|
| Region wide | 2020 Districtwide HFST | Installing HFST, dotted extension pavement markings at intersections, advance curve warning markings, and centerline/edge line rumble strips where applicable | N/A ⁶ | New Regional |
| | 2021 Districtwide HFST | Installing HFST, dotted extension pavement markings at intersections, advance curve warning markings, and centerline/edge line rumble strips where applicable | N/A ⁷ | |

Source: DVRPC 2020

Infrastructure (Pavement and Bridge) Performance Management Measures Rule (PM2)

The FHWA final rule for the National Performance Management Measures; Assessing Pavement Condition for the National Highway Performance Program and Bridge was published in the Federal Register (82 FR 5886) on January 18, 2017 and became effective on February 17, 2017. It established performance measures for all State DOTs to use to carry out the National Highway Performance Program (NHPP) and to assess the condition of pavements on the Interstate System, pavements on the National Highway System (NHS) (excluding the Interstate System), and bridges carrying the NHS which include on- and off-ramps connected to the NHS. The NHPP is a core Federal-aid highway program that provides support for the condition and performance of the NHS and the construction of new facilities on the NHS. The NHPP also ensures that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets as established in a State's Transportation Asset Management Plan (TAMP) for the NHS. The Infrastructure Performance Management Measure rule requires the State DOT to report and manage performance of the NHS, regardless of ownership or maintenance responsibility, for the full extent of the Interstate and Non-Interstate NHS. This final rule establishes regulations for the new performance aspects of the NHPP that address measures, targets, and reporting.

⁶ High Friction Surface application noted 70 to 80 percent wet pavement crash reduction based on previous studies and Everyday Counts Initiative. PennDOT did not perform HSM analysis for each corridor. Based on past studies PennDOT is focusing on 50 percent or above select ratio for wet pavement cluster list. This typically yields to significant benefit/cost ratio in range of 70 to 80.

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The pavement and bridge performance measures include:

- % of Interstate pavements in good condition
- % of Interstate pavements in poor condition
- % of Non-Interstate NHS pavements in good condition
- % of Non -Interstate NHS pavements in poor condition
- % of NHS bridges by deck area classified in good condition
- % of NHS bridges by deck area classified in poor condition

State 2-year and 4-year targets (the desired state of good repair) were due May 20, 2018. Like the Highway Safety Performance Measure, MPOs must establish targets by either agreeing to support the State targets or establishing their own quantifiable targets no later than 180 days after a State DOT establishes (or amends) its targets. On October 25, 2018, the DVRPC Board agreed to support PennDOT's statewide Pavement and Bridge Infrastructure Performance targets and PennDOT's efforts at achieving those targets shown in Tables 15 and 16 below. Note that 2-year targets (FY18-FY19) for the Interstate are not required for the first performance period (hence "n/a"). The "Baseline" in Tables 15 to 20 is based on the most recent calendar year of data (2017). DVRPC will be revisiting the targets for PM2 in the Fall of 2020 as part of the 2-year interim review.

Pavement Performance Targets

The Infrastructure Performance Management Measure rule requires the State DOT to report and manage performance of the NHS, regardless of ownership or maintenance responsibility, for the full extent of the Interstate and Non-Interstate NHS.

Federal rulemaking 23 U.S.C. 119 requires that all distress component information be collected for one-tenth-mile increments. Pavement condition is measured by four distress components (International Roughness Index, Cracking, Rutting, and Faulting), which are then translated to good, fair, or poor condition scores per FHWA criteria and then broken out into separate values for the Interstate and Non-Interstate NHS.

- **International Roughness Index (IRI)** – Quantifies how rough the bituminous and concrete pavement is by measuring the longitudinal profile of a traveled wheel track and generating a standardized roughness value in inches per mile.
- **Cracking** – Measures the percentage of bituminous and concrete pavement surface that is cracked.
- **Rutting** – Measures the depth of ruts (surface depression) in bituminous pavement in inches.
- **Faulting** – Quantifies the difference in elevation across transverse concrete pavement joints in inches.

Determining pavement condition requires rigorous data collection. In the past, all PennDOT data was collected for each roadway segment, which is approximately one-half-mile in length. Federal rulemaking 23 U.S.C. 119 now requires that all distress component information be collected for one-tenth-mile increments. PennDOT and its partners have adjusted their pavement data collection to meet FHWA standards. Data collection at the tenth-mile increment level began in 2017 for cracking, rutting, and faulting and will be used for this submission of the TAMP.

Table 12: State Pavement Infrastructure Performance Targets

| Pavement Infrastructure | Condition | Baseline | 2-Year Target | 4-Year Target |
|--|-----------|----------|---------------|---------------|
| Interstate Pavement Lane Miles | Good | 67.2% | n/a | 60.00% |
| | Poor | 0.4% | n/a | 2.00% |
| Non-Interstate NHS Pavement Lane Miles | Good | 36.8% | 35.00% | 33.00% |
| | Poor | 2.3% | 4.0% | 5.0% |

Source: DVRPC 2020

PennDOT’s pavement condition targets (its desired state of good repair) for NHS Interstate roadways mirror the federal standard: no more than 5 percent of Pennsylvania’s NHS Interstate pavements shall be rated in poor condition. PennDOT’s pavement condition targets, see Table 12:, are consistent with its asset management objectives of maintaining the system at the desired state of good repair, managing to lowest life cycle costs (LLCC), and achieving national and state transportation goals.

Although the 2-year and 4-year targets assume pavement condition worsening, PennDOT and DVRPC are committed to a long-term goal of improving pavement conditions, and achieving a sustainable “state of good repair.” Further, less than 5 percent of the NHS Interstate pavements are rated in poor condition, per federal requirement. If the threshold is not met, restrictions are placed on PennDOT’s federal funding—specifically, NHPP and Surface Transportation Program (STP) funds. FHWA has not established a minimum condition for NHS non-Interstate roadways, but requires the State DOT to establish performance targets.

Bridge Performance Targets

The FHWA final rulemaking also established performance measures for all mainline Interstate Highway System and non-Interstate NHS bridges regardless of ownership or maintenance responsibility, including bridges on ramps connecting to the NHS and NHS bridges that span a state border. FHWA’s performance measures aim to assess bridge condition by dividing the percentage of NHS bridges rated in good and poor condition by deck area on the NHS.

Separate bridge structure condition ratings are collected for deck, superstructure, and substructure components during regular inspections using the National Bridge Inventory (NBI) Standards. For culvert structures, only one condition rating is collected (the culvert rating). A rating of 9 to 0 on the FHWA condition scale is assigned to each component. Based on its score, a component is given a good, fair, or poor condition score rating.

A structure’s overall condition rating is determined by the lowest rating of its deck, superstructure, substructure, and/or culvert. If any of the components of a structure qualify as poor, the structure is deemed poor. 23 CRF 490.411(a) requires that no more than 10 percent of a state’s total NHS bridges by deck area are in poor condition. It is important to note that poor does not correlate to the safety rating of the bridge. The bridge condition performance measures are calculated by summing the deck area of bridges in “good” and “poor” condition and dividing by the total deck area of all NHS bridges.

As with the pavement condition measures, DVRPC relied upon PennDOT for calculation of bridge condition metrics and supports PennDOT’s Statewide targets (the desired state of good repair) in Table 13:

Table 13: State NHS Bridge Infrastructure Performance Targets

| Bridge Infrastructure | Condition | Baseline | 2-Year Target | 4-Year Target |
|-----------------------|-----------|----------|---------------|---------------|
| NHS Bridge Deck Area | Good | 25.6% | 25.8% | 26.0% |
| | Poor | 5.5% | 5.6% | 6.0% |

Source: DVRPC 2020

PennDOT’s bridge condition targets are consistent with its asset management objectives of maintaining the system at the desired state of good repair, managing to LLCC, and achieving national and state transportation goals.

Coordination on Bridge and Pavement Performance Targets

A TAMP Steering Committee was formed in January 2017. The Committee is comprised of representation from PennDOT Executive Management, FHWA, and the Pennsylvania Turnpike Commission (PTC), as well as PennDOT’s Engineering Districts, Asset Management Division, Center for Program Development and Management, Bureau of Planning and Research, and Highway Safety and Traffic Operations Division. The purpose is to manage and coordinate the development, submission, and implementation of the TAMP, and the pavement and bridge condition performance measures. The TAMP Steering Committee met on January 4, 2017, February 6, 2017, September 21, 2017, October 31, 2017, November 13, 2017, December 21, 2017, and April 16, 2018.

A workshop was conducted on October 12, 2017, with PennDOT, Planning Partners and FHWA Pennsylvania Division staff related to fully integrating an asset management approach into decision-making. A workshop was conducted on January 11, 2018, with PennDOT and FHWA Pennsylvania Division staff to identify future steps and requirements related to the TPM rulemaking. PennDOT provided status updates on the development of performance measure data, tools, and methodologies to the Planning Partners. On October 18, 2017, PennDOT provided an overview of the performance measures and general approaches for target setting at the Planning Partners Fall Conference in State College. On a March 20, 2018, conference call, PennDOT provided a status update on the development of baseline measures and targets. PennDOT conducted a webinar on May 9, 2018, to review the State DOT targets with the Planning Partners. PennDOT has worked to develop the Pennsylvania Department of Transportation MAP 21 and FAST Act Performance Management Road Map to provide Planning Partners with a resource on the performance measure requirements and calculations.

Progress Toward Pavement and Bridge Performance Targets

DVRPC is dedicated towards system preservation for pavement and bridges. The DVRPC Long-Range Plan (“Plan”) places an increased emphasis and analysis related to transportation system preservation needs and funding, which in turn informs the fiscally-constrained list of projects included in the Long-Range Plan and TIP. In the DVRPC PA region, the Plan identified \$42.6 billion needed for pavement and bridge preservation projects. Of this total need, \$1.97 billion is programmed in the four-year Draft FY2021 TIP for system preservation, under the regional TIP, which does not include the majority of the I-95 reconstruction, which is listed on the Statewide Interstate Management Program.

Per Table 20 in the Draft 2045 Amended Long-Range Plan (2020), system preservation receives the most funding of all highway project types. Of the entire \$26.0 billion allocated to all roadway improvements in the Plan, 50 percent or \$13 billion is allocated to bridge preservation, followed by 30.5 percent or \$7.9 billion for pavement preservation. Table 21 in the Draft 2045 Amended Long-Range Plan (2020) lists all major regional system preservation projects needed to maintain the existing system.

At the time that the FY2021 TIP was released for Public Comment, 26.9 percent or almost \$529.1 million out of \$1.97 billion total in the First-Four Years of all projects in the DVRPC Regional Highway Program were bridge preservation projects, which was the highest percentage of all TIP project categories. 16.8 percent or \$331.7 million was programmed for roadway rehabilitation, reconstruction, and restoration over the First-Four Years of the TIP. Major regional roadway preservation projects and their current funding status are shown in the TIP.

Facility and Asset Condition is the second highest ranked criterion in DVPRC's TIP-LRP Project Benefit Criteria, accounting for 22 percent of the investment recommendation. Projects score well by bringing a facility or asset into a state of good repair, extending the useful life of a facility or asset, or providing reduced operating/maintenance costs. A focus on fix-it-first has helped to reduce the Pennsylvania subregion's state-maintained poor condition bridges from 22 percent of all deck area in 2007 to just 9 percent in 2018.

The major regional system preservation projects funded in the TIP are as follows:

- PA 309 Sellersville Bypass (MPMS #86923)
- Darby Road Extension (North Valley Road over Amtrak)(MPMS #47979)
- US 1 Reconstruction in Chester County (MPMS #14580, #14581)
- US 422 Reconstruction (MPMS #14698, #16738, #64220)
- US 1 Roosevelt Boulevard over Wayne Junction (MPMS #83736)

System Performance (NHS, Freight, CMAQ) Performance Management Measures Rule (PM3)

The FHWA final rule for the National Performance Management Measures; Assessing Performance of the National Highway System, Freight Movement on the Interstate System, and Congestion Mitigation and Air Quality Improvement Program was published in the Federal Register (82 FR 5970) on January 18, 2017, and became effective on May 20, 2017.

This final rule is the third in a series of three related rulemakings that together establish a set of performance measures for State DOTs and MPOs to use as required by MAP-21 and the FAST Act. The measures in this third final rule will be used by State DOTs and MPOs to assess the performance of the Interstate and non-Interstate NHS for the purpose of carrying out the NHPP; to assess freight movement on the Interstate System; and to assess traffic congestion and onroad mobile source emissions for the purpose of carrying out the Congestion Mitigation and Air Quality Improvement (CMAQ) Program. These system performance measures are collectively referred to as PM3 measures. System Performance Management Measures include the following listed below that are divided into three categories: Travel Time Reliability, Congestion, and Emissions Reduction. Each category has its own measures.

Travel Time Reliability (TTR)

- Percent of Person-miles Traveled (PMT) on the Interstate System that are Reliable
- Percent of PMT on the Non-Interstate NHS that are Reliable
- Interstate System Truck TTR Index

CMAQ Congestion

- Annual Hours of Peak-Hour Excessive Delay (PHED) per Capita
- Percent of Non-Single Occupant Vehicle (SOV) Travel
- CMAQ Emissions Reduction
 - On-Road Mobile Source Emissions Reduction for CMAQ-funded Projects

State 2-year and 4-year targets were due May 20, 2018. Like Safety Performance Measures and Infrastructure Performance Measures, MPOs must establish targets by either agreeing to support the State targets or establishing their own quantifiable targets no later than 180 days after a State DOT establishes (or amends) its targets. If the MPOs establish their own performance measure targets, they should coordinate with PennDOT on the selection of the targets in accordance with 23 U.S.C. 134(h)(2)(B)(i)(II) to ensure consistency, to the maximum extent practicable.

On September 24, 2020, the DVRPC Board agreed to support PennDOT's statewide NHS System Performance and Freight System Performance targets and PennDOT's efforts at achieving those targets shown in Table 14: and Table 15:. The DVRPC Board agreed to support PennDOT's CMAQ Congestion targets and the CMAQ Emissions Reductions targets on September 24, 2020.

Travel Time Reliability (TTR) Targets

Reliability refers to the variability of travel times on road segments experienced by travelers. The more variability in travel time then the less reliable the trip. Traffic congestion occurs when the amount of traffic far exceeds the physical capacity of the system, generally measured by the number of travel lanes on the roadway, the number of intersections, access points, and numerous other factors. Reliability is used in reference to the level of consistency in the transportation service provided by a roadway. For example, a roadway can be heavily congested, but if the amount and time of day when congestion occurs on it is consistent, it is considered reliable. The US DOT established performance measures pertaining to reliability because empirical evidence exists to suggest that the traveling public values reliability more than straight travel times. The Traffic Congestion and Reliability: Linking Solutions to Problems is available on the FHWA website at https://ops.fhwa.dot.gov/congestion_report_04/chapter2.htm.

The first major performance area under system performance is Travel Time Reliability (TTR). The measures for TTR are the percentage of person-miles traveled (PMT) on the Interstate on the National Highway System (NHS) with reliable travel times, and the percentage of PMT on the non-Interstate NHS with reliable travel times. Travel times in this measure are derived from the National Performance Management Data Set (NPMRDS v2), based on archived probe-based traffic data, and traffic volumes are from the Highway Performance Monitoring System (HPMS). The measures are calculated using the UMD CATT Lab RITIS Probe Data Analytics (PDA) software platform, and generated by roadway segment using the Level of TTR metric, defined as the ratio of the longer travel times (80th percentile) to a "normal" travel time (50th percentile). Any value equal or less than 1.50 is considered reliable. The percentage of person-miles traveled that are reliable for the region is the ratio of the reliable segments TTR multiplied by segment traffic volumes to all segments TTR multiplied by traffic volumes.

Due to potential tool enhancements, limited historic information, and the need for additional research to understand the variances and factors influencing each of the performance measures, the MPOs have collaboratively decided to keep the future 2-year and 4-year TTR Targets for Interstate and Non-Interstate the same as the 2017 baseline values (See Table 14:). Moving forwards as more reliable NPMRDS v2 data is expected to be available over the next four six years, future trends may be more evident to revise and adjust targets.

In some respects, these may be more appropriately referred to as benchmarks. PennDOT will track the measures over the next two years. States are permitted to adjust their 4-year targets at the midterm of the performance period, representing data through 2019 in a report due to FHWA by October 1, 2020. PennDOT will coordinate any updates to the performance measures with the Planning Partners.

Table 14: State Travel Time Reliability Targets

| NHS System | Baseline | 2-Year Target | 4-Year Target |
|--|----------|---------------|---------------|
| Person Miles Traveled on Interstate with Reliable Travel Times (%) | 89.8% | 89.8% | 89.8% |
| Person Miles Traveled on Non-Interstate NHS with Reliable Travel Times (%) | 87.4% | n/a | 87.4% |

Source: DVRPC 2020

Freight/Truck Travel Time Reliability Targets

The national system performance measure for freight is the Truck Travel Time Reliability (TTTR) Index and is required for interstate highways on the NHS only. Like TTR this measure is derived from the NPMRDS v2 data and calculated using UMD CATT Lab RITIS PDA software platform. It is expressed as an index, unlike the TTR measure which is based on a percent reliability threshold that determines whether a segment is reliable or not. TTTR is the ratio between the “congested” (95th percentile) and “average” (50th percentile) truck travel times. This metric is averaged for all Interstate road segments in the state, weighted by distance, resulting in the TTTR Index for the state.

As with the TTR performance measures, PennDOT and the MPOs have collaboratively decided to keep the future 2-year and 4-year TTTR Targets for Interstate the same as the 2017 baseline values (See Table 15:).

Table 15: State Freight Performance Targets on the NHS Interstate Highway System

| Freight | Baseline | 2-Year Target | 4-Year Target |
|-------------------------------|----------|---------------|---------------|
| Truck Travel Time Reliability | 1.34% | 1.34% | 1.34% |

Source: DVRPC 2020

Future revisions and modifications to the PDA tool may impact the reported performance measures and established targets, so PennDOT will track the measures over the next two years. States are permitted to adjust their 4-year targets at the midterm of the performance period, representing data through 2019 in a

report due to FHWA by October 1, 2020. PennDOT will coordinate any updates to the performance measures with the Planning Partners.

Coordination on Travel Time Reliability (TTR) and Freight/Truck TTR Targets

The very first State 2-year and 4-year targets were due May 20, 2018, and have been reported to FHWA in the 2017 baseline report that was due October 2018. To satisfy coordination requirements [23 CFR 490.105(e)(2)], PennDOT has coordinated with Planning Partners in the development of the measures and selection of targets to ensure consistency, to the maximum extent practicable. Specific coordination efforts are highlighted below:

A workshop was conducted on January 11, 2018 with PennDOT and FHWA Pennsylvania Division staff to identify future steps and requirements related to the TPM rulemaking. PennDOT conducted a performance measure workshop on February 26-27, 2018, with the Pittsburgh, Philadelphia, and York MPO planning staffs to evaluate baseline performance measure trends and methodologies for target setting. PennDOT provided status updates on the development of performance measure data, tools, and methodologies to the Planning Partners. On October 18, 2017, PennDOT provided an overview of the performance measures and general approaches for target setting at the Planning Partners Fall Conference in State College. On a March 20, 2018, conference call, PennDOT provided a status update on the development of baseline measures and targets. PennDOT conducted a webinar on May 9, 2018, to review the State DOT targets with the Planning Partners. Four TPM meetings were held for the Philadelphia PA-NJ-DE-MD urbanized area to coordinate, discuss, and establish target setting for the PHED and Non-SOV travel measures. The meetings occurred on February 16, March 19, April 9, and April 30 of 2018. Agency representation included PennDOT, New Jersey Department of Transportation (NJDOT), Delaware Department of Transportation (DelDOT), Maryland Department of Transportation (MDOT), FHWA, Delaware Valley Regional Planning Commission (DVRPC), North Jersey Transportation Planning Authority (NJTPA), South Jersey Transportation Planning Organization (SJTPO), Wilmington Area Planning Council (WILMAPCO), Lehigh Valley Planning Commission (LVPC), Reading Area Transportation Study (RATS), and Lancaster County Transportation Coordinating Committee (LCTCC). PennDOT has worked to develop the Pennsylvania Department of Transportation MAP- 21 and FAST Act Performance Management Road Map to provide Planning Partners with a resource on the performance measure requirements and calculations.

Pennsylvania MPOs/RPOs that include, within their respective geographic boundaries, any portion of the applicable transportation network or area must establish targets for the performance measures no later than 180 days after PennDOT establishes (or amends) its targets. The MPOs/RPOs must establish targets by either agreeing to the State target for that performance measure or establishing their own quantifiable target for that performance measure. If the MPOs establish their own performance measure targets, they should coordinate with PennDOT on the selection of the targets in accordance with 23 U.S.C. 134(h)(2)(B)(i)(II) to ensure consistency, to the maximum extent practicable.

Progress Toward Travel Time Reliability (TTR) and Freight/Truck TTR Targets

DVRPC is committed to improving reliability on roadways within its region in Pennsylvania, as well as working with its county, city, and transit partners, and PennDOT staff to develop projects that will inevitably improve TTR and help meet State targets. The Congestion Management Process (CMP) is a key part of DVRPC's commitment to improving travel time reliability. DVRPC facilitates a CMP Planning Advisory Committee that is part of an overall, systematic, and ongoing process to determine where traffic congestion exists, identify causes, prioritize congested locations according to congestion and other CMP objective measures, and to help develop strategies to reduce congestion. The goals of the Long-Range Plan provide guidelines for developing DVRPC CMP objectives. These objectives include:

- minimize growth in recurring congestion and improve reliability of the transportation system;
- provide transit where it is most needed for accessibility;
- maintain existing core transportation network;
- Improve safety and reduce non-recurring congestion by reducing crashes;
- maintain movement of goods by truck;
- Maintain transportation preparedness for major events, especially ones that call for interregional movements far beyond normal and serve routine needs; and,
- Ensure that all transportation investments support DVRPC Long-Range Plan principles.

PM3 performance measures are mapped by roadway segment where data is available, and used to inform the CMP process. Reliability, as measured by the Planning Time Index (PTI), is a key component of the Congestion and Reliability criterion in DVRPC’s TIP-LRP Benefit Criteria. Projects score based on location in a CMP congested corridor, implementing a CMP strategy appropriate for that corridor, or being located on a road with a high PTI; or transit facility with a low on-time performance. This criterion accounts for 13 percent of the project-level investment decision recommendation.

As mentioned earlier, DVRPC proactively seeks to include freight as a primary planning factor through its Long-Range Plan, TIP development, and the conduct of technical studies. Truck counts are a component of the Multimodal Use criterion in DVRPC’s TIP-LRP Benefit Criteria. Projects score based on the total number of person trips (driver trips + passenger trips + transit trips + bike trips + pedestrian trips) and daily trucks using the facility or asset, and overall benefit to multimodal trip making. This criterion accounts for 9 percent of the project-level investment decision recommendation. One of DVRPC’s goals is to serve the region’s freight stakeholders and maintain the Philadelphia-Camden-Trenton region as an international freight center. At the forefront of DVRPC’s freight planning program is the Delaware Valley Goods Movement Task Force (DVGMTF), a broad-based freight advisory committee that provides a forum for the private-and public-sector freight community to include its unique perspectives on regional plans and specific projects.

Table 5: in Chapter 2: shows a sampling of TIP projects that support freight mobility and TTR as part of promoting goods movements and economic development. In the DVRPC TIP, the following projects are programmed within a DVRPC designated Freight Center that supports freight travel time reliability:

- Bridgewater Road Extension (MPMS #79329)
- I-476, MacDade Boulevard Ramp Improvements (MPMS #70228)
- I-76 Integrated Corridor management (MPM #106662)
- PA 291 Drainage Improvement (MPMS #99668)
- I-95 Reconstruction (17821, 47811, 47812, 47813, 79686, 79827, 79828, 79904, 79905, 79908, 79910, 79912, 103557, 103558, 103559, 103560, 103561, 103562)

The FAST Act established the NFP to improve the efficient movement of freight on the National Highway Freight Network. NFP’s eligibility criteria require that a project contribute to the efficient movement of freight and be identified in the state’s freight investment plan. States may use up to 10% of NFP funding each year for public or private freight rail, water facilities (including ports), and/or intermodal facilities. There are only 10 projects in the entire state of Pennsylvania that are programmed with federal National Highway Freight Program (NFP) funds and four (4) of them are located in the DVRPC region:

- **I-95 Northbound: Race-Shackamaxon (GR5) (MPMS #79828)** provides for the reconstruction, rehabilitation, and widening of I-95 northbound between Race Street and Shackamaxon Street, and the

reconstruction of the northern Vine Street interchange ramp connection with I-95. This project includes rehabilitation, deck replacement, demolition, and replacement of eight bridges.

- **I-95: Betsy Ross Section Ramps A&B (BR2) (MPMS #79904)** provides for the construction for the replacements of both Ramp A and Ramp B structures in the Betsy Ross Interchange including approach roadway work in the City of Philadelphia.
- **I-95 Southbound: Ann Street to Wheatsheaf Lane (AF4) (MPMS #103558)** provides for the reconstruction of I-95 from Clearfield Street to Wheatsheaf Lane, including reconstruction of the SB on-ramp and SB off-ramp at Allegheny Avenue.
- **I-95: Betsy Ross Mainline Southbound (BR4) (MPMS #103559)** provides funding for southbound mainline construction from Wheatsheaf Lane to SR 0095 north of Margaret St. This contract will also remove the southbound collector/distributor and ramp which connects Aramingo Avenue, Harbison Avenue, Tacony Street and Bridge Street to I-95 southbound and the Betsy Ross Bridge.

DVRPC is a member of PennDOT's Freight Advisory Committee and The Eastern Transportation Coalition (formerly known as the I-95 Corridor Coalition) and provided feedback on the development of the 2016 PennDOT Comprehensive Freight Movement Plan. The I-95 Coalition provides a forum for state, local, and regional transportation agencies and organizations from Maine to Florida to work together to improve transportation mobility, safety, efficiency, and system performance. Coalition members facilitate more efficient network operations through regional incident management planning, coordination, and communication and improved information management across jurisdictions and modes.

Finally, there are also several grant programs (outside of DVRPC) administered by the State and the Federal governments specifically targeting freight. PennDOT's [Rail Freight Assistance program \(RFAP\)](#), and [Rail Transportation Alternatives Program \(RTAP\)](#) provides assistance for investment in rail freight infrastructure. The USDOT's [Better Utilizing Investments to Leverage Development \(BUILD\)](#) grant program (formerly known TIGER) and the [Infrastructure for Rebuilding America \(INFRA\)](#) grant program (formerly known as the Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies , or FASTLANE program) provides for major investments in roads, rail, transit and port infrastructure.

CMAQ Congestion Targets

The Congestion Mitigation and Air Quality Program (CMAQ) is a federal program that funds projects that reduce congestion and improve air quality. The CMAQ Congestion and Emissions Reduction Targets are specifically intended to reduce congestion, directly related to attributes of CMAQ funded projects, and unlike other federally-required performance measures described in this chapter, specifically apply to Urbanized Areas with a population over 1 million in a non-attainment or maintenance area. The DVRPC region is part of the Philadelphia PA-NJ-DE-MD Urbanized Area with a population of almost 5.54 million, per the U.S. Census American Community Survey (ACS) 2018 5-year estimate, and is part of a non-attainment and maintenance area. It shares a small portion of the New York-Newark NY-NJ-CT UZA in Mercer County, New Jersey.

CMAQ Congestion has two measures for the applicable urbanized area, which are:

- **Annual Hours of Peak Hour Excessive Delay (PHED) Per Capita on the NHS:** The PHED measure is derived from the NPMRDS v2 travel time data, traffic volumes and vehicle mix (cars, buses, and trucks) from HPMS, and vehicle occupancies and time-of-day travel distributions from national survey data and established estimation formulas. The population used to normalize the annual hours was acquired from the U.S. Census ACS 2016 5-year estimates.

The measure indicates traffic delay experienced by travelers throughout an entire year on roadways, specifically during peak periods. The morning peak is defined as weekdays from 6 a.m. to 10 a.m.,

and partner agencies agreed on the afternoon peak period from 3 p.m. to 7 p.m., rather than 4 p.m. to 8 p.m. time period. Excessive delay means the extra amount of time spent in congested conditions defined by speed thresholds that are lower than a normal delay. The speed threshold is 20 miles per hour, or 60 percent of the posted speed limit travel time, whatever is greater. The “excessive” part of the PHED name indicates that some level of congestion is recognized as not possible or desirable to eliminate and thus not counted. For example, some congestion can accompany economic activity in thriving places. The “per capita” implies that the total delay is shared by all residences. Some trips can be avoided or shifted to non-vehicular modes out of the peak period, which would reduce the measure. This measure sums up the delay experienced by travelers throughout an entire year on NHS roads, specifically during peak periods. The actual rule containing all the details are found in 23 CFR 490.707(a).

- **Percent of Non-Single Occupancy Vehicle (non-SOV) travel on the NHS:** Non-SOV travel may include travel via carpool, van, public transportation, commuter rail, walking or bicycling as well as telecommuting. The actual rule containing all the details are found in 23 CFR 490.707(b).

For the PHED per capita measure, only a four-year target is required at this time, while both two and four-year targets are required from the base year for the Percent Non-SOV measure. The CMAQ Congestion Performance Targets that are established by PennDOT and supported by the DVRPC Board are shown in Table 16:

Table 16: CMAQ Congestion Measures Targets on the National Highway System

| DVRPC Urbanized Areas | CMAQ Congestion Measures | Baseline | 2-Year Target | 4-Year Target |
|---|--------------------------|-----------------------|-----------------------|-----------------------|
| Philadelphia PA-NJ-DE-MD Urbanized Area | Non-SOV Travel | 27.9% ¹ | 28.0% | 28.1% |
| | PHED per Capita | 16.8 Hours per Capita | 17.0 Hours per Capita | 17.2 Hours per Capita |

1. Baseline for Non-SOV Travel is based on 2014-2018 American Community Survey (ACS).

2. PHED per Capita 4-Year Target assumes a growth of +0.6% per year.

3. See also DVRPC’s CMAQ Interim Performance Plan for 2018-2019 (Publication #TM21003)

Source: DVRPC, 2020

Coordination on CMAQ Congestion Targets

Pursuant to the FAST Act and MAP-21, and the ensuing requirements of 23 CFR Part 490, the National Performance Management Measures Final Rule, all State DOTs and MPOs that contain, within their respective boundaries, any portion of the NHS network within the Urbanized Area with a population over 1 million must establish a single unified target for the two CMAQ congestion measures. DVRPC staff collaborated with multiple agencies in developing and agreeing on a single realistic target for each of the two measures.

Meetings were held by the DVRPC for the Philadelphia PA-NJ-DE-MD Urbanized Area to coordinate, discuss and establish target setting for the PHED and Non-SOV travel measures. The meetings occurred on February 16th, March 19th, April 9th and April 30th of 2018. Agency representation included PennDOT, New Jersey Department of Transportation (NJDOT), Delaware Department of Transportation (DelDOT), Maryland Department of Transportation (MDOT), FHWA, and the Delaware Valley Regional Planning Commission (DVRPC), Northern Jersey Transportation Planning Authorization (NJTPA), South Jersey Transportation Planning Organization (SJTPA), Wilmington Area Planning Council (WILMAPCO), Lehigh Valley Planning

Commission (LVPC), Reading Area Transportation Study (RATS), and Lancaster County Transportation Coordinating Committee (LCTCC) MPOs. The agencies developed and agreed on a common congestion measure baseline and targets for the Philadelphia Urbanized Area. Since there is a portion of the New York-Newark NY-NJ-CT UZA in Mercer County, New Jersey, within the DVRPC region, DVRPC also collaborated with the NJTPA, the New York Metropolitan Transportation Council, NJDOT, the New York Department of Transportation and others to adopt a common congestion measure baseline and targets for that Urbanized Area. On May 24, 2018, the DVRPC Board agreed to support CMAQ congestion performance measure targets for PHED per Capita and percentage Non-SOV travel for the Philadelphia and New York urbanized areas.

On May 24, 2018, the DVRPC Board agreed to support CMAQ congestion performance measure targets for PHED per Capita and percent Non-SOV travel for the Philadelphia and New York urbanized areas. DVRPC is a MPO that serves a Transportation Management Area (TMA) with a population greater than 1 million that includes a nonattainment or maintenance area. As such, DVRPC was required to develop a CMAQ Performance Plan for 2018-2021 to support the implementation of these CMAQ Congestion measures. In the CMAQ Performance Plan, which is required to be updated biennially through the performance period, the MPO must describe how they plan to meet the targets, detail their progress toward achieving the targets over the course of the Performance Plan, and include a description of projects identified for funding that will contribute to achieving targets. The DVRPC Board approved the submission of the DVRPC plan to PennDOT and NJDOT for submission to FHWA on September 24, 2020. The report named DVRPC’s CMAQ Interim Performance Plan for 2018-2019 (Publication #TM21003) can be found on DVRPC website.

CMAQ Emissions Reduction Targets

DVRPC coordinated efforts with PennDOT and other MPOs in the state to develop cumulative On-road Mobile Source Emissions 2-year and 4-year reduction targets as kilograms per day. MPO regional targets in Table 17: were used to develop PennDOT’s statewide on-road mobile emissions reductions targets displayed in Table 18: Page 15 of DVRPC’s Interim CMAQ Performance Plan for 2018-2019 (Publication #TM21003) describes the process in developing the regional targets.

Table 17: DVRPC Pennsylvania Region CMAQ On-Road Emissions Reductions Targets (in Daily Kilograms)

| CMAQ Emission Reduction | 2-Year Target (2018-2019) | 2-Year Performance | 4-Year Target (2020-2021) |
|-------------------------|---------------------------|--------------------|---------------------------|
| VOC | 37.61 | 142.8 | 69.31 |
| NO _x | 23.42 | 652.4 | 42.50 |
| PM _{2.5} | 1.08 | 24.21 | 2.06 |
| CO | 282.74 | n/a | n/a |

Source: DVRPC, 2020

Table 18: PennDOT Statewide CMAQ On-Road Emissions Reductions Targets (in Daily Kilograms)

| CMAQ Emission Reduction | 2-Year Target | 4-Year Target |
|-------------------------|---------------|---------------|
| VOC | 109.46 | 201.73 |
| NO _x | 337.70 | 612.82 |
| PM _{2.5} | 10.76 | 20.49 |
| PM ₁₀ | 9.54 | 0.0 |
| CO | 567.70 | 250.0 |

Source: DVRPC, 2020

Coordination on CMAQ Emissions Reduction Targets

DVRPC has coordinated emissions reduction target setting with both PennDOT and NJDOT to establish emissions reduction targets from CMAQ funded projects in the relevant portions of the DVRPC planning areas. Each state has developed state-level emissions reductions targets that account for emissions reductions at the MPO level. On September 24, 2020, the DVRPC Board agreed to support PennDOT’s and NJDOT’s statewide CMAQ Emission Reduction targets and PennDOT’s efforts at achieving those targets mentioned above, as well as adopt the MPO regional targets, and approve DVRPC to submit the CMAQ Interim Performance Plan for 2018-2019 (Publication #TM21003) to PennDOT for submission to FHWA.

Progress Toward CMAQ Congestion and Emissions Reduction Targets

There are projects in the TIP that will help the MPO and State meet two-and four-year targets for traffic congestion and on-road mobile source emissions. Table 9 in DVRPC’s CMAQ Interim Performance Plan for 2018-2019 (Publication #TM21003) identifies all TIP projects in the PA portion of the DVRPC region from FY2018 – FY2019.

DVRPC will continue to promote and develop projects and programs with air quality benefits to its counties and planning partners. As part of DVRPC’s Congestion Management Process, DVRPC facilitates a Congestion Management Process (CMP) Planning Advisory Committee and generates a list of the top 10 bottlenecked locations for State, County and Local Roadways. The objectives for DVRPC’s CMP is to (1) minimize growth in recurring congestion and improve reliability of the transportation system; (2) provide transit where it is most needed for accessibility; (3) maintain the existing core transportation network; (4) improve safety and reduce non-recurring congestion by reducing crashes; (5) maintain movement of goods by truck; (6) maintain transportation preparedness for major events, especially ones that call for interregional movements far beyond normal and serve routine needs; and at the end of the day, ensure that all transportation investments support DVRPC Long-Range Plan principles. Chapter 2 explains more about the CMP.

Besides the individual CMAQ funded projects, there are several continuing programs that utilize CMAQ funding to reduce emissions (as well as congestion), throughout the state. These projects and programs are listed below.

Air Quality Action Supplemental Services (MPMS #17928)—This program will fund supplemental services performed by contractors in the implementation of the Air Quality Action program. Types of services may include design and production of education and outreach materials and advertising, printing, and placement of advertising on television, online, radio, and in newspapers. Advertisements will educate the public about ozone and PM 2.5 pollution and encourage actions to reduce activities that contribute to air pollution,

especially on days that are forecast as unhealthy for people susceptible to ozone and PM 2.5 pollution. Funding is provided in the amount of \$125,000 in FY21, and \$125,000 in FY22.

Retrofit for Bike Lanes and Shoulders (MPMS #63406)—The purpose of this project is to maintain existing and future bicycle facilities, including installation, maintenance, and replacement of striping and damaged and missing signs. Funding is provided annually in the amount of \$300,000 in FY21, and \$300,000 in FY22.

Signal Retiming program (MPMS #84457)—This signal re-timing program provides for the evaluation of existing signals along an identified corridor, with the goal of improving traffic operations along said corridor through revised signal timing plans. CMAQ funding is provided annually: \$350,000 annually from FY21 through FY22.

Philadelphia Signal Retiming (MPMS #96223)—This project is a congestion reduction and traffic flow improvement program. This program receives \$1 million in FY22 from CMAQ.

Mobility Alternative Program (MAP)/Share a Ride Program (MPMS #110429)—Geared to employers, MAP is an outreach and education program overseen by DVRPC to provide information to employers and commuters about options to the single occupant auto for commuting to work. This program receives \$588,000 CMAQ annually, with a local match of \$148,000.

Commuter Services (MPMS #110460)—This project is a work program project that allows for staff to coordinate alternative commute education and outreach programs among MAP and TMA contractors. This program receives \$201,000 CMAQ annually, with a state match of \$34,000 and a local cash match of \$16,000.

Transportation Management Associations (MPMS #111424)—Transportation Management Associations (TMA's) help address demand for the region's transportation system. They are public-private partnerships that provide a forum to resolve transportation issues in their service areas. Services include a range of transportation improvement options, including task forces, employer and construction project shuttles, advocacy, and congestion reduction assistance to employers along corridors and in municipalities. This program receives \$1,064,000 CMAQ annually, with a local match of \$265,000.

Much of the congestion within the DVRPC region occurs on State-owned and maintained highways, which are part of the NHS. Therefore, PennDOT has invested a significant amount of resources in congestion relief programs statewide. Progress is being made towards meeting the congestion relief and on-road mobile emissions reductions targets.

Transit Asset Management Rule

Under the provisions of the Transit Asset Transportation Performance Management rulemaking, Transit Operators are required to set performance targets for their transit asset portfolio. Metropolitan Planning Organizations (MPOs) are then required to set their own targets, or adopt the Transit Operators targets, for the transit asset portfolio in their region, beginning in calendar year 2017, based on measures mandated by the rule. The performance measures were selected by the Federal Transit Administration and include: average revenue fleet age; average non-revenue fleet age; percent of the track system under a performance restriction; and percentage of facilities that are below a condition rating of 3 on the Transit Economic Requirements Model (TERM) scale. Transit agencies are required to upload their performance targets, as well as a supporting narrative, in their annual National Transit Database (NTD) submission, and report progress against these targets. They are also required to develop a Transit Asset Management (TAM) Plan.

Transit Asset Management Targets and Goals

Measure 1: Average Revenue Fleet Age:

The agencies' vehicle engineering departments provide useful life benchmarks (ULB) for their respective fleets. A number of planned procurements will allow SEPTA to reduce the average age of the rail vehicle fleet in future reporting years. The majority of SEPTA's buses are within their useful life benchmarks (ULBs). However, it should be noted that a significant number of the light rail and commuter rail vehicles are beyond their useful life benchmarks. This does not mean that the vehicles are unsafe; however, additional maintenance may be required to allow these fleets to maintain service quality and performance. SEPTA will replace the light rail and vintage trolley fleets as part of the Trolley Modernization project, which is part of the Projects of Significance program.

Measure 2: Average Age of Non-Revenue Fleet:

The agencies maintain a diverse portfolio of support vehicles, including fleets of police cars, utility vans, and rail maintenance vehicles. The performance targets are developed by comparing the age of the vehicles to their useful life benchmark. A number of ongoing procurements have allowed SEPTA to reduce the average age of the automobile and van fleets. PATCO anticipates that the non-revenue service vehicles over their ULB will decrease to 28% for FY 2020.

SEPTA utility vehicles support transit and railroad operations, and include the following types of equipment: Utility vehicles for transit and paratransit supervisors and SEPTA police officers. Utility vehicles are used for inspection, maintenance and construction of infrastructure. These vehicles include trucks, cranes, high rail vehicles and maintenance-of-way equipment. Transporter vehicles used in garages and shops, including revenue trucks, forklifts for material handling, pick-up trucks for material movement between depots and shops, and for snow removal. Service vehicles that are used for vehicle maintenance including wreckers, tow tractors, man lifts and pick-up trucks. Miscellaneous equipment such as generators, compressors, trailers, floor scrubbers and welding units are also used.

Measure 3: Percentage of Track Segments with Performance Restrictions:

The FTA requires transit agencies to report the percentage of the right of way that is operating under performance restriction on the first Wednesday of each month at 9:00 AM. This number is to be averaged at the end of the year. Performance targets are based on infrastructure condition and speed restriction reports and include provisions for planned maintenance work throughout the year. For FY 2019, approximately 0.23% of PATCO's track was in slow zone restrictions over the year. It is estimated that approximately 0.76% of their track will be in slow zone restrictions over FY 2020 due to an increase of scheduled maintenance work.

Measure 4: Average Condition of Facilities:

The FTA requires transit agencies to evaluate all transit facilities on the Transit Economic Requirements Model (TERM) scale (5.0=new, 1.0=poor, Assets below a rating of 3.0 are not in a state-of-good-repair.) Facilities are to be evaluated every four years based on the inspections performed by the agency's asset management groups; SEPTA's and DRPA's facilities are generally in a state of good repair.

Table 19: Transit Asset Management Measure 1

| Percentage of Revenue Vehicles That Have Met or Exceeded Their Useful Life Benchmark | | | | |
|--|-------------------------------|-----------------|-----------------|-----------------|
| NTD Category | Useful Life Benchmark (Years) | FY 2019 Targets | FY 2019 Measure | FY 2020 Targets |
| SEPTA | | | | |
| AB: Articulated Bus | 14 | 0% | 0% | 0% |
| BU: Bus | 14 | 10% | 12.4% | 10% |
| HR: Heavy Rail Passenger Vehicle | 35 (MFL/NHSL); 40 (BSS) | 0% | 0% | 0% |
| RL: Commuter Rail Locomotive | 30 | 50% | 0% | 0% |
| RP: Commuter Rail Passenger Coach | 30 | 0% | 0% | 0% |
| RS: Commuter Rail, Self-Propelled | 30 | 66% | 66% | 66% |
| CU: Cutaway Car | 7 | 0% | 0% | 0% |
| SR: Street Car | 30 | 100% | 100% | 100% |
| TB: Trolley Bus | 18 | 0% | 0% | 0% |
| VT: Vintage Trolley/Streetcar | 15 | 100% | 100% | 100% |
| PATCO | | | | |
| HR: Heavy Rail Passenger Vehicle | 39 | 0% | 0% | 0% |

Source: DVRPC 2020

Coordination on Transit Asset Management Target Setting

MPOs have 180 days after the transit agencies set their targets, to decide to either adopt the transit operators’ targets or develop their own metropolitan targets. DVRPC has taken formal action to adopt the same set of targets as SEPTA and DRPA/PATCO. DVRPC has also worked with SEPTA, DRPA/PATCO, and the Pennsylvania Department of Transportation (PennDOT) to develop a set of written procedures that outline the coordination process for Transit Asset Management. SEPTA and DRPA/PATCO operate on different fiscal years (FY): SEPTA’s FY is July 1 through June 30, while DRPA/PATCO’s FY is January 1 through December 31.

Table 20: Transit Asset Management Measure 2

| Percentage of Support Vehicles That Have Met or Exceeded Their Useful Life Benchmark | | | |
|--|----------------|-----------------|----------------|
| NTD Category | FY 2019 Target | FY 2019 Measure | FY 2020 Target |
| SEPTA | | | |
| Automobiles | 75% | 43% | 50% |
| Other Rubber Tired Vehicles | 40% | 20% | 25% |
| Steel Wheel Vehicles | 60% | 51% | 55% |
| PATCO | 24% | 22% | 28% |

Source: DVRPC 2020

Table 21: Transit Asset Management Measure 3

| Percentage of Track Segments with Performance Restrictions (by Mode) | | | |
|--|----------------|-----------------|----------------|
| NTD Mode | FY 2019 Target | FY 2019 Measure | FY 2020 Target |
| SEPTA | | | |
| CR: Commuter Rail | 10% | 3.5% | 10% |
| HR: Heavy Rail | 10% | 1.8% | 10% |
| SR: Streetcar Rail | 5% | 1.3% | 5% |
| PATCO | 1.44% | 0.23% | 0.76% |

Source: DVRPC 2020

Progress Towards Transit Asset Management Targets

The Transit Asset Transportation Performance Management rule requires MPOs to describe how the region’s Transportation Improvement Program (TIP) will help to achieve the Transit Asset Management targets. The DVRPC FY 2021 TIP was developed to ensure progress toward target achievement. The following steps have been taken by the transit operators to ensure that projects selected for TIP funding help to achieve the Transit Asset Management targets. Overall, SEPTA has programmed almost 87% of their Draft FY2021 TIP funding for preservation and maintenance of their system. PATCO is a bi-state agency and their transit projects are shown in the New Jersey TIP, which is reviewed by FTA Region II. PATCO does not have any transit projects in the Pennsylvania TIP. Similar language for PATCO’s transit projects in New Jersey will be shown in the New Jersey TIP.

Table 22: Transit Asset Management Measure 4

| Average Condition of Facilities | | | |
|---------------------------------|--------------------------|----------------------------|--------------------------|
| NTD Category | FY 2019 Target | FY 2019 Measure | FY 2020 Target |
| SEPTA | | | |
| Passenger Facilities | 5% < 3 on the TERM Scale | 2% < 3 on the TERM Scale | 5% < 3 on the TERM Scale |
| Maintenance Facilities | 5% < 3 on the TERM Scale | 0% < 3 on the TERM Scale | 5% < 3 on the TERM Scale |
| PATCO | | | |
| Passenger Facilities | 0% < 3 on the TERM Scale | 7.7% < 3 on the TERM Scale | 0% < 3 on the TERM Scale |
| Maintenance Facilities | 0% < 3 on the TERM Scale | 0% < 3 on the TERM Scale | 0% < 3 on the TERM Scale |
| Administration Facilities | 0% < 3 on the TERM Scale | 0% < 3 on the TERM Scale | 0% < 3 on the TERM Scale |

Source: DVRPC 2020

To meet the targets for Measure 1: Percentage of Revenue Vehicles That Have Met or Exceeded Their Useful Life Benchmark, SEPTA’s fleet management plan has been designed to maintain the bus and paratransit fleets at an age below the established ULB and provide the appropriate level of VOH for all fleets; however, SEPTA recognizes that additional investment is needed in the rail fleets, maintenance facilities, and infrastructure to bring them to a current vehicle standard. SEPTA’s Capital Budget identifies several fleet procurements that will effectively decrease the age of the light rail and commuter rail fleets that are beyond their useful life benchmarks. The Silverliner IV fleet was purchased between 1973 and 1976. This procurement is programmed for FY 2025 through 2031. SEPTA is also working on a “Trolley Modernization” program, which includes an evaluation of the light rail and vintage trolley fleets, along with associated infrastructure and maintenance facility upgrades. Both of these projects are included as “unfunded projects of regional significance” in SEPTA’s FY21 Capital Budget.

To meet targets that were set for Measure 2: Percentage of Support Vehicles That Have Met or Exceeded Their Useful Life Benchmark, SEPTA programs on average \$7 million annually in their Utility Fleet Renewal Program – Non-revenue Vehicles program. These vehicles include automobiles for transit supervisors and operator support personnel; utility vehicles for the inspection, maintenance, and construction, of operating facilities, overhead power systems, signal systems, and track; and service vehicles and equipment for use in garages, shops, and operations support functions. In order to have adequate and reliable utility vehicles, SEPTA has developed a program to periodically renew this fleet on a vehicle-by-vehicle basis contingent upon the vehicle’s age, condition, and usage within the Authority.

To meet targets that were set for Measure 3: Percentage of Track Segments with Performance Restrictions (by Mode), SEPTA evaluated the scope of planned maintenance work when establishing the performance targets for 2020. SEPTA will continue the cyclical replacement of railroad tie timbers and overhead contact wire. Tie work is generally performed between the hours of 9:00 AM and 3:00 PM; therefore, maintenance

projects will continue to cause a performance restriction. In the case of a condition that requires a speed restriction, SEPTA deploys crews to fix the issue as soon as possible. SEPTA's Resiliency Program is performing several projects that will harden the infrastructure against extreme weather events, such as stabilization of four slopes on the Main Line and one slope on the Manayunk/ Norristown Line; installation of new pumps on the Broad Street Subway; flood mitigation at near Jenkintown and Sharon Hill Stations; and emergency power for the signal system.

For the last measure, Measure 4, Average Condition of Facilities, SEPTA's 2020-2032 Capital Budget includes provisions of \$193.8M and \$283.9M for maintenance and passenger facilities, respectively. Representative projects include Ardmore Transportation Center, Conshohocken Station, 5th Street Station, and 30th Street Station. SEPTA continues to design improvements for City Hall Station, and has started to design improvements for Fairmont Station, which were rated to be in poor condition. Construction for these stations is scheduled to begin in 2020 and 2024, respectively. SEPTA has programmed \$39.4 million annually and \$11.1 million annually for Transit & Regional Rail Station and Maintenance & Transportation Facilities improvements over the next four years, respectively. These investments will help bring various stations, bus and rail maintenance shops, facilities maintenance shops, and office buildings to a state of good repair. Additionally, SEPTA spends \$45.2 million per year of TIP funding on their Federal Preventative Maintenance Program, which includes repair of buildings, grounds, and equipment (including, but not limited to, the overhaul of vehicles), fare collection, equipment and structures, and maintenance of general administration buildings.

Transit Safety Rule

The Public Transportation Agency Safety Plan (PTASP) regulation, at 49 C.F.R. Part 673, requires covered public transportation providers and state DOTs to establish safety performance targets (SPTs) to address the safety performance measures identified in the National Public Transportation Safety Plan (49 C.F.R. § 673.11(a)(3)). Transit agencies and states must identify SPTs by mode for each of the following categories:

- Fatalities: Total number of fatalities reported to NTD and rate per total vehicle revenue miles (VRM) by mode.
- Injuries: Total number of injuries reported to NTD and rate per total VRM by mode.
- Safety Events: Total number of safety events reported to NTD and rate per total VRM by mode.
- System Reliability: Mean distance between major mechanical failures by mode.

Transit agencies are required to set their initial safety performance targets by July 20, 2020. 49 C.F.R. § 673.15(b) requires, to the maximum extent practicable, a state or transit agency to coordinate with states and MPOs in the selection of State and MPO safety performance targets; and in accordance with 49 U.S.C. 5303(h)(2)(B) and 5304(d)(2)(B), states and transit agencies must make their SPTs available to states and MPOs to aid in the planning process. MPOs are required to set performance targets for each performance measure, per 23 C.F.R. § 450.306; and these must be established 180 days after the transit agency establishes their performance targets. FTA will not impose penalties for failing to meet safety performance targets set by transit providers.

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