COMMONWEALTH *of* VIRGINIA

Office of the

SECRETARY *of* TRANSPORTATION

Federal Transportation Performance Management

October 11, 2022

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Agenda

- Safety Performance Measures
  - Performance and Targets
  - CTB Actions
- Infrastructure Condition Performance and Targets
  - Performance and Targets
- System Performance Measures: Performance and Targets
  - Performance and Targets
- MPO Requirements
  - Safety
  - Infrastructure Condition and System Performance
- Resources

Safety Performance Management Background

- MAP-21 federal law establishes performance targets for Safety
  - (5 measures)
- Safety targets must be established annually
- VDOT and Department of Motor Vehicles' Highway Safety Office coordinate on 3 of the 5 performance measures
- DMV must report targets to NHTSA by June 30
- VDOT must report targets to FHWA by August 31
- FHWA makes an annual determination of a states progress towards achievement of its targets

Safety Performance Management
Federal Measures

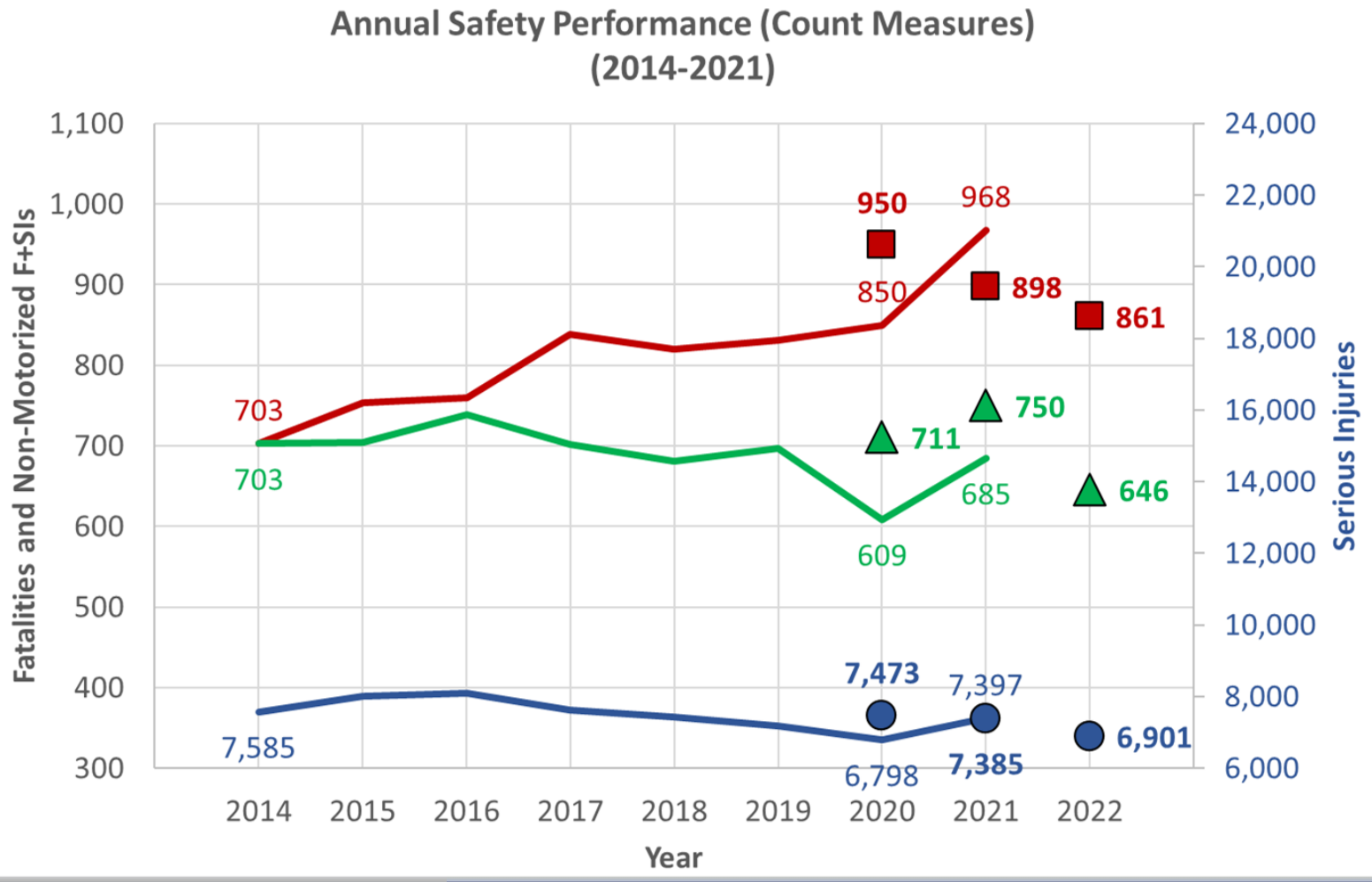
What do we measure?

- Number of fatalities* - person involved died at scene or within 30 days
- Number of serious injuries* - suspected serious injury, typically taken to hospital
- Rate of fatalities per 100M vehicle miles traveled*
- Rate of serious injuries per 100M vehicles miles traveled
- Number of non-motorized, bicyclist and pedestrian, fatalities and serious injuries

*Federal measures requiring coordination with the Governor's Highway Safety Office.

Safety Performance Management
Performance and Targets

How are we doing?

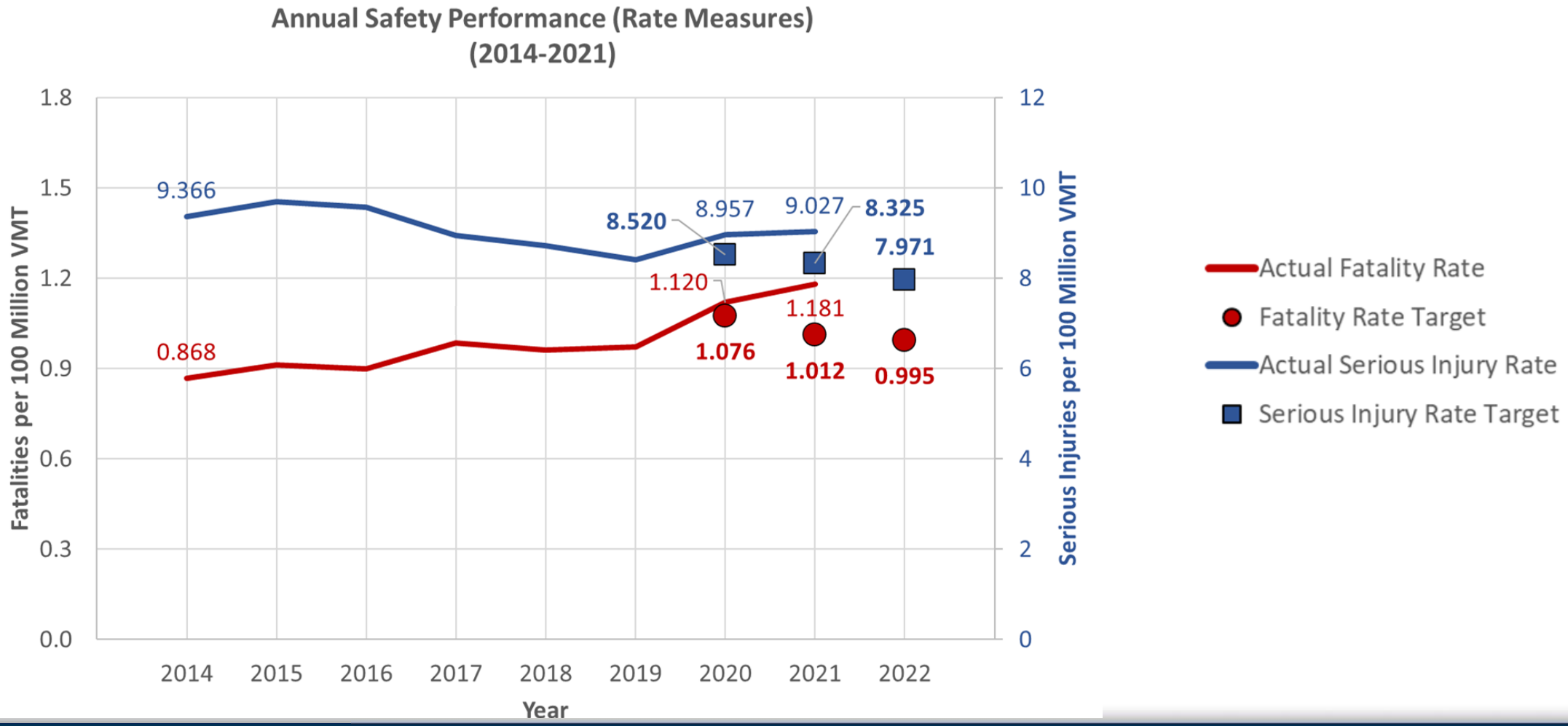


Board adopted targets beginning in 2019 using a model-based approach

- Actual Annual Fatalities (FARS)
- Fatalities Target
- Actual Annual Non-Motorized F+SI
- Non-Motorized F+SI Target
- Actual Annual Serious Injuries
- Serious Injuries Target

Safety Performance Management Performance and Targets

How are we doing?



Safety Performance Management
Target Setting Steps

Key steps to develop 2023 targets:

Step 1: Update and refine predictive model to establish baseline target values

Step 2: Incorporate anticipated annual reductions of projects that were recently or soon to completed

Step 3: Combine results from steps 1 and 2 to establish proposed 2023 targets

Prediction Model Factors and Measure Effects

Factor By District	Effect on Fatal Crashes	Effect on Serious Injury Crashes	Effect on Bike/Ped Crashes
VMT growth	↑	↑	↑
Increasing local functional class percent of VMT	↑	↑	↑
Increasing young population (15-24)	↑	↑	↑
Increasing aging population (75+)	↑	↑	
Gallons Liquor Sold		↑	
Liquor licenses			↑
Increased highway resurfacing spending	↓		
Increased emergency/incident management spending	↓		
Increased total behavioral programs spending	↓	↓	↓
Increased roadway maintenance spending		↓	
Increased average snowfall per month			↓
Increased rural functional class percent of VMT			↓

VMT: Vehicle Miles Traveled

↕ = Increases Effect
↕ = Decreases Effect

Step 2: Quantify Anticipated Annual Crash Reductions from Projects

Reviewed 200 SMART SCALE and HSIP

- More than 5,500 Fatal and Serious Injury crashes at those project locations
- Systemic project return on investment is 50 to 90 times greater than spot/corridor projects

Anticipated Annual Crash Reductions from Projects*			
Description	Fatalities	Serious Injuries	Ped/Bike F + SI
Spot/Corridor Reduction	2	16	2
Hybrid Reduction	1	3	0
Systemic Reduction	6	67	13
Total Anticipated Annual Reductions (Benefits)	**9**	**86**	**15**

*All values have been rounded

Step 3: Proposed 2023 Safety Measures Targets

Combine the baseline predictions (Step1) with project benefits (Step 2) to establish targets

Calculating Proposed 2023 Safety Targets					
Description	**Fatalities**	**Fatality Rate**	**Serious Injuries**	**Serious Injury Rate**	**Ped/Bike F & SI**
STEP 1: Update and refine predictive model to establish baseline	1021	1.227	7511	9.074	677
STEP 2: Incorporate anticipated annual reductions of projects that were recently or soon to completed	9	---	86	---	15
STEP 3: Proposed 2023 Targets	**1012**	**1.216**	**7465**	**8.971**	**662**

CTB Actions

- CTB adopted the Federal Safety Performance Targets from data-driven model (June 21, 2022)
- CTB also found the projected safety outcomes to be unacceptable and:
  - Adopted Aspirational Safety Performance Goals
    - Based on the goals in the 2022-2026 Strategic Highway Safety plan to reduce fatalities and serious injuries by two percent per year
  - Directed OIPI, VDOT and DMV to:
    - Evaluate and identify actionable strategies to improve safety performance
    - Evaluate how such strategies will help to achieve the Aspirational Safety Performance Goals
    - Present to the CTB no later than October 2022

2023 Aspirational Safety Performance Goals					
Description	**Fatalities**	**Fatality Rate**	**Serious Injuries**	**Serious Injury Rate**	**Ped/Bike F & SI**
Aspirational Safety Performance Goals	**930**	**1.117**	**7104**	**8.537**	**658**

Infrastructure Condition and System Performance

- MAP-21 Federal Law – established performance measures for:
  - Infrastructure Condition
    - Bridge
    - Pavement
  - System Performance
    - Highway and Freight Reliability
    - Traffic Congestion
    - Emission Reduction
  - Established 4-year Performance Periods to monitor performance

~~October 1 –~~ December 16 Submission Deadline
1st Performance Period Final Report (2018-2021)
2nd Performance Period Baseline Report (2022-2025)

Federal Performance Management Requirements
Performance Period Requirements

- Each 4-year **Performance Period** (based on Calendar year) requires:
  - Development of 2-year and 4-year targets
  - Baseline Report
    - Establishes baseline conditions, targets and strategies to achieve targets
  - Mid-Term Performance Report
    - Identifies mid-point performance and updates to strategies to achieve targets
    - Provides opportunity to adjust 4-year targets (requires justification)
  - Final Performance Report
    - Discusses actual performance, observed trends, and investment strategies that impact performance

Federal Performance Measure Requirements
Infrastructure Condition

What do we measure?

Measures	Scope
• Percentage of Bridges in Good Condition • Percentage of Bridges in Poor Condition	NBI on NHS
• Percentage of Pavements in Good Condition • Percentage of Pavements in Poor Condition	Interstate
• Percentage of Pavements in Good Condition • Percentage of Pavements in Poor Condition	Non-Interstate NHS

The National Highway System (NHS) represents

- 13% of VDOT maintained roads on the Interstate, Primary and Secondary road systems (18,854 lane miles out of 140,238 lane miles)
- 18% of bridge inventory (3,786 out of 21,160 bridges)

Note: Bridge targets and performance includes bridges “owned by others” i.e. Federal, Private, and Border Bridges

NHS – National Highway System
NBI – National Bridge Inventory, Bridges over 20 feet in length

Infrastructure Condition
Bridge Performance Measures

In 2019, CTB adopted Statewide pavement and bridge performance measures and targets based on Maintenance and Operations Comprehensive Review (**Comprehensive Review**) and investment strategy

State Performance Measures	Federal Performance Measures
1. GCR (General Condition Rating) 2. Percent non-Poor (Sufficient) Structures	1. Based on Percent in Good Condition 2. Percent in Poor Condition
Applicable to entire network	Applicable to National Highway System portion only
Provides an overall characterization of the general condition of the entire bridge, used on all bridges	Based only on good and poor condition
Drives maintenance decisions, emphasizes long term sustainability and preservation of fair bridges	Used for reporting as required by the FHWA

Infrastructure Condition
Federal Bridge Target Setting Approach

Proposed Federal targets are based on predictions of future conditions resulting from the implementation of the optimized investment strategy for all bridges (not just NHS)

- Investment strategy focused on long term performance and sustainability while keeping bridges rated in fair condition from becoming poor
- Improving the percentage of good bridges while they still have useful service life is an inefficient use of funds
- Projected performance (targets) of bridges on the NHS are extracted from the full data set

This results in proposed federal targets for the 2nd performance period reflecting a slight decline in performance as a result of the optimized investment strategy on the full system

Infrastructure Condition
Federal Bridge Performance and Targets

Measure	1st Performance Period CTB Adopted Targets (percent)		Annual Performance (percent)					2nd Performance Period Proposed Targets (percent)	
	2-yr (2019)	4-yr (2021)	2017	2018	2019*	2020	2021	2-yr (2023)	4-yr (2025)
Percentage of NBI Bridges on the NHS in GOOD Condition	33.5	30.5	33.6	32.5	31.8	29.4	29.8	**27.2**	**25.1**
Percentage of NBI Bridges on the NHS in FAIR Condition	n/a	n/a	62.9	64.5	65.6	67.5	67.1	n/a	n/a
Percentage of NBI Bridges on the NHS in POOR Condition	3.5	3.0	3.5	3.0	2.6	3.1	3.0	**3.3**	**3.6**

*Virginia did not make **Significant Progress** toward its original 2-year target for Percentage of NBI Bridges on the NHS in Good Condition. The CTB adopted a revised 4-year target in September 2020.

NHS – National Highway System
NBI – National Bridge Inventory

Infrastructure Condition
Pavement Performance Measures

In 2019, CTB adopted Statewide pavement and bridge performance measures and targets based on Maintenance and Operations Comprehensive Review (**Comprehensive Review**) and investment strategy

State Performance Measures	Federal Performance Measures
1. CCI (Critical Condition Index) 2. Percent Sufficient (CCI 60 or greater)	1. Percent in Good Condition 2. Percent in Poor Condition
Applicable for entire network by system	Applicable to National Highway System portion only
Based on ten or more distresses for each pavement type	Based on two or three distresses for each pavement type
Drives maintenance decisions and focuses on long term sustainability	Used only for reporting as required by the FHWA

Infrastructure Condition
Federal Pavement Target Setting Approach

Proposed Federal targets are based on predictions of future conditions from the implementation the optimized investment strategy for all pavements (not just NHS)

- Investment strategy focused on long term performance of the pavement network
- Predicted performance of the pavement network based on state performance measures which are correlated to produce performance on the Federal portion of the network
- The predicted performance combined with the historical performance trends are used to develop the federal targets

This approach results in proposed targets that reflect expected performance on the federal portion of the network while the strategy is aimed at improving and maintaining performance the full VDOT maintained network.

Infrastructure Condition
Federal Pavement Performance and Targets
Interstate

How are we doing?

Measure (Percentage of)	1st Performance Period CTB Adopted Targets (percent)		Annual Performance (percent)					2nd Performance Period Proposed Targets (percent)	
	2-yr (2019)	4-yr (2021)	2017	2018	2019*	2020	2021	2-yr (2023)	4-yr (2025)
Pavement on the Interstate in GOOD Condition	45	45	57.8	57.5	57.9	56.3	57.3	**45**	**45**
Pavement on the Interstate in FAIR Condition	n/a	n/a	41.7	42.2	41.8	43.5	42.6	n/a	n/a
Pavement on the Interstate in POOR Condition	3.0	3.0	0.5	0.3	0.3	0.2	0.1	**3.0**	**3.0**

*Virginia made **Significant Progress** toward its 2-year targets.

Infrastructure Condition
Federal Pavement Performance and Targets
Non-Interstate National Highway System

How are we doing?

Measure (Percentage of)	1st Performance Period CTB Adopted Targets (percent)		Annual Performance (percent)					2nd Performance Period Proposed Targets (percent)	
	2-yr (2019)	4-yr (2021)	2017	2018	2019*	2020	2021	2-yr (2023)	4-yr (2025)
Pavement on the Non-Interstate NHS in GOOD Condition	25	25	35.4	34.8	36.7	36.6	33.5	**25**	**25**
Pavement on the Non-Interstate NHS in FAIR Condition**	n/a	n/a	63.6	64.3	62.4	62.6	66.0	n/a	n/a
Pavement on the Non-Interstate NHS in POOR Condition**	5.0	5.0	1.0	0.9	0.9	0.8	0.5	**5.0**	**5.0**

*Virginia made **Significant Progress** toward its 2-year targets.

Federal Performance Measure Requirements
System Performance - Reliability

What do we measure?

System Performance Measures*	Scope
Percentage of Person-Miles Traveled that are Reliable	Interstate
Percentage of Person-Miles Traveled that are Reliable	Non-Interstate NHS
Truck Travel Time Reliability Index	Interstate

Reliability: the consistency or predictability in travel times, as measured from day-to-day and/or across different times of the day

*FHWA requires a specific data set for the analysis of Travel Time Reliability.

System Performance
Federal Reliability Target Setting Approach

- Percentage of Person Miles Traveled that are Reliable on the Interstate
  - Based on predictive model developed for this purpose - CTB presentation in March 2022
- Percentage of Person Miles Traveled that are Reliable on the Non-Interstate
  - Algorithm based on changes in reliability over the past several years along with volume growth
- Truck Travel Time Reliability Index (Interstate only)
  - Linear regression analysis along with volume growth

Note: Development of each measure considers the impact of infrastructure improvements; however, additional work is underway to improve the analysis and better understand the benefits of investments on reliability.

System Performance
Federal Reliability Performance and Targets

How are we doing?

Measure	1st Performance Period CTB Adopted Targets		Annual Performance					2nd Performance Period Proposed Targets	
	2-yr (2019)	4-yr (2021)	2017	2018	2019	2020	2021	2-yr (2023)	4-yr (2025)
Person-Miles Traveled that are Reliable - Interstate (%)	82.2%	82.0%	84.3%	82.4%	83.6%	93.8%	86.3%	**85.0**	**85.0**
Person-Miles Traveled that are Reliable - Non-Interstate NHS (%)	n/a	82.5%	86.8%	88.0%	88.9%	97.76%	95.0%	**88.0**	**88.0**
Truck Travel Time Reliability Index	1.53	1.56	1.48	1.58	1.55*	1.32	1.49	**1.64**	**1.64**

*Virginia did not make **Significant Progress** toward its original 2-year target for Truck Travel Time Reliability Index. No change to the 4-year target was proposed.

Federal Performance Measure Requirements
Traffic Congestion and Air Quality

What do we measure?

Measures*	Scope
Annual Hours of Peak Hour **Excessive Delay** (PHED) Per Capita	Interstate
Percent of Non-Single Occupancy Vehicle (SOV) Travel (Mode Share)	Urbanized Area
Total Emission Reductions	CMAQ-funded projects

- Traffic Congestion and Air Quality Targets are set regionally
- Targets for PHED and Mode Share must be identical between the three state DOTs as well as the adjoining Metropolitan Planning Organizations (National Capital Region, Fredericksburg and Baltimore Region)

*Only required for the National Capital Region.

Excessive delay is travel below 60% of the posted speed limit or 20mph, whichever is greater on NHS routes.

System Performance
Federal Traffic Congestion and Air Quality
Target Setting Approach

- Annual Hours of Peak Hour **Excessive Delay** (PHED) Per Capita
  - Utilized an average of observed trends combined with an indicator value from the Transportation Planning Board (TPB) travel demand model
- Percentage of Non-SOV Travel
  - Based on trend line analysis from data reporting in the American Community Survey
- Total Emissions Reduction is the cumulative 2- and 4-year reported emission reductions for:
  - All new programmed CMAQ funded projects in Northern Virginia
  - Applicable criteria for pollutants
    - Applicable Pollutants: Volatile Organic Compounds (VOC) and nitrogen oxides (NOx)
  - TPB combines the Total Emissions Reduction estimates from each DOT to establish the target for the National Capital Region

System Performance - Federal Traffic Congestion and Air Quality Performance and Targets

How are we doing?

Measure *	1st Performance Period CTB Adopted Targets		Annual Performance					2nd Performance Period Proposed Targets	
	2-yr (2019)	4-yr (2021)	2017	2018	2019	2020	2021	2-yr (2023)	4-yr (2025)
Annual Hours of Peak Hour Excessive Delay Per Capita (hrs/capita)	n/a	26.7	23.0	24.2	24.5	9.1	12.8	**22.5**	**22.7**
Percentage of Non-SOV Travel	36.9%	37.2%	36.6%	36.6%	36.6%	37.0%	39.5%	**37.4%**	**37.7%**
Cumulative reported emissions reductions - Volatile Organic Compounds**	1.721	1.985	3.499	2.061	4.491	4.935	8.040	**0.323**	**3.013**
Cumulative reported emissions reductions - Nitrogen Oxides**	3.744	4.230	5.369	3.843	9.068	9.164	10.895	**0.612**	**4.911**

*Only required for the National Capital Region.
**Performance values are for Virginia portion and each individual year. Baseline data is cumulative for 2014-2017. Performance period data are cumulative for 2018 through 2021 (meaning 2018 is actual, 2019 is 2018 + 2019, etc.)

MPO Requirements - Safety

- **Safety (23 CFR 490.209)**
  - **Establish targets 180 days after VDOT submission of the HSIP Annual Report – no later than February 27, 2023**
  - **Targets shall represent anticipated performance outcomes for all public roads**
    - Agree to plan and program projects to contribute toward accomplishment of state targets
    - Commit to a quantifiable target for their MPA
  - **Report targets to VDOT in agreed to manner (Uses Planning Connections Sharepoint Site)**

- **VDOT provides an excel-based tool for calculation of Safety Performance Targets**
  - **Development of tool is delayed due to**
    - changes in method used to calculate VMT and
    - changes in the Richmond Region TPO boundary
  - **Obtaining 10-15 years of crash and VMT data with the new boundary to develop trend of 5-year averages**
  - **Anticipated delay of 2-3 weeks**

MPO Requirements - Infrastructure Condition and System Performance

- **Infrastructure Condition and System Performance (23 CFR 490.105, 23 CFR 490.107)**
  - **Establish 4-year targets 180 days after the State establishes its targets – TBD**
  - **Targets shall represent anticipated performance outcomes relevant to each performance measure**
    - Agree to plan and program projects to contribute toward accomplishment of state targets
    - Commit to a quantifiable target for their MPA
  - **Report targets to VDOT in agreed to manner (Uses Planning Connections Sharepoint Site)**

- **VDOT provides**
  - **Annual performance data for each applicable measure**
  - **Projected performance for reliability measures (TTTR pending)**

Resources

- June 2022 – CTB Adoption of Safety Targets - https://www.ctb.virginia.gov/resources/2022/june/res/15.pdf
- July 2022 – CTB Presentation for proposed Infrastructure Condition and System Performance Targets - https://www.ctb.virginia.gov/resources/2022/july/pres/8.pdf
- September 2022 – CTB Adoption of Infrastructure Condition and System Performance Targets - https://www.ctb.virginia.gov/resources/2022/sept/res/12.pdf
- September 2022 – CTB Presentation and Resolution of Revised Highway Safety Investment Strategy
  - https://www.ctb.virginia.gov/resources/2022/sept/pres/1_highway_safety_strategy_update_sep_2022_ctb_final.pdf
  - https://www.ctb.virginia.gov/resources/2022/sept/res/10.pdf
- 2022-2026 Strategic Highway Safety Plan - https://www.virginiadot.org/info/hwysafetyplan.asp
- 2022 Transportation Asset Management Plan - https://www.virginiadot.org/projects/resources/legstudies/VDOT_-_2022_Transportation_Asset_Management_Plan.pdf

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Thank you.