# 2022 CONGESTION MANAGEMENT PROCESS (CMP) TECHNICAL REPORT

## Executive Summary

July 2022

National Capital Region
**Transportation Planning Board**

**CONGESTION MANAGEMENT PROCESS (CMP) TECHNICAL REPORT**
Prepared on behalf of the Transportation Planning Board Technical Committee
July 8, 2022

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The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 24 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AADT | Annual Average Daily Traffic |
| ACS | American Communities Survey |
| ART | Arlington Transit |
| ATIS | Advanced Traveler Information Systems |
| ATM | Active Traffic Management |
| ATRI | American Transportation Research Institute |
| AVL | Automatic Vehicle Location |
| BRAC | Base Closure and Realignment Commission |
| BWI | Baltimore/Washington International Thurgood Marshall Airport |
| CAFE | Corporate Average Fuel Economy |
| CAV | Connected and Autonomous Vehicle(s) |
| CATT | Center For Advanced Transportation Technology |
| CCTV | Closed-Circuit Television |
| CHART | Coordinated Highway Action Response Team |
| CLRP | Constrained Long-Range Plan |
| CLV | Critical Lane Volume |
| CMP | Congestion Management Process |
| CMS | Congestion Management System |
| CNG | Compressed Natural Gas |
| CO | Carbon Monoxide |
| COC | Commuter Operations Center |
| CUE | City-University-Energysaver |
| DASH | Driving Alexandrians Safely Home |
| DCA | Ronald Reagan Washington National Airport |
| DMS | Dynamic Message Signs |
| DOT | Department of Transportation |
| EPC | Emergency Planning Council |
| FAF | Freight Analysis Framework |
| FHWA | Federal Highway Administration |
| MPSTOC | McConnell Public Safety and Transportation Operations Center |
| MTA | Maryland Transit Administration |
| MWAA | Metropolitan Washington Airports Authority |
| MWCOG | Metropolitan Washington Council of Governments |
| MWRITSA | Metropolitan Washington Regional Intelligent Transportation Systems Architecture |
| NCHRP | National Cooperative Highway Research Program |
| NCR | National Capital Region |
| NEPA | National Environmental Policy Act |
| NGA | National Geospatial Agency |
| NHS | National Highway System |
| NOx | Nitrogen Oxides |
| NPMRDS | National Performance Management Research Data Set |
| NPRM | Notice of Proposed Rulemaking |
| NTOC | National Transportation Operations Coalition |
| NVRC | Northern Virginia Regional Commission |
| NVTC | Northern Virginia Transportation Commission |
| PBPP | Performance-Based Planning and Programming |
| PM | Particulate Matter |
| PRTC | Potomac and Rappahannock Transportation Commission |
| PSTOC | Public Safety Transportation Operations Center |
| PTI | Planning Time Index |
| RITIS | Regional Integrated Transportation Information System |
| RFC | Region Forward Coalition |
| RTPP | Regional Transportation Priorities Plan |
| SAFETEA-LU | Safe Accountable Flexible Efficient Transportation Equity Act - A Legacy for the Users |
| SIP | State Implementation Plans |
| SOC | State of the Commute Survey |
| SOV | Single Occupancy Vehicle |
| SRTS | Safe Routes to Schools |

| | |
|---|---|
| FSCPPE | Federal State Cooperative Program for Population Estimates |
| GHG | Greenhouse Gas Emissions |
| GPS | Geographic Positioning System |
| GRH | Guaranteed Ride Home |
| HOT | High Occupancy/Toll |
| HOV | High Occupancy Vehicle |
| HPMS | Highway Performance Monitoring System |
| IAD | Washington Dulles International Airport |
| ICC | Inter-County Connector |
| ICM | Integrated Corridor Management |
| IMR | Incident Management and Response |
| IS | Interstate System |
| ITS | Intelligent Transportation Systems |
| IVR | Interactive Voice Response |
| LATR | Local Area Transportation Review |
| LAUS | Local Area Unemployment Statistics |
| LOS | Level of Service |
| MAP-21 | Moving Ahead for Progress in the 21st Century Act |
| MARC | Maryland Area Rail Commuter |
| MAROps | Mid-Atlantic Rail Operations |
| MATOC | Metropolitan Area Transportation Operations Coordination |
| MATOps | Mid-Atlantic Truck Operations |
| MDSHA | Maryland State Highway Administration |
| MNCPPC | Maryland – National Capital Park and Planning Commission |
| MOITS | Management, Operations, and Intelligent Transportation Systems |
| MPO | Metropolitan Planning Organization |
| TARS | Travelers Advisory Radio System |
| TAZ | Traffic Analysis Zone |
| TCSP | Transportation, Community and System Preservation |
| TDM | Transportation Demand Management |
| TE | Transportation Enhancements |
| TERM | Transportation Emission Reduction Measure |
| TIGER | Transportation Investment Generating Economic Recovery |
| TIP | Transportation Improvement Program |
| TLC | Transportation/Land Use Connections |
| TMA | Transportation Management Area |
| TMC | Traffic Management Center; Traffic Message Channel |
| TOC | Transportation Operations Center |
| TOD | Transit-Oriented Development |
| TPB | Transportation Planning Board |
| TTI | Travel Time Index |
| TTID | Transportation Technology Innovation and Demonstration |
| UPT | Unlinked Passenger Trip |
| VDRPT | Virginia Department of Rail and Public Transportation |
| VHD | Vehicle Hours of Delay |
| VHT | Vehicle Hours of Travel |
| VMT | Vehicle Miles of Travel |
| VOC | Volatile Organic Compound |
| VPL | Variably Priced Lane |
| VPP | Vehicle Probe Project |
| VRE | Virginia Railway Express |
| WMATA | Washington Metropolitan Area Transit Authority |

# EXECUTIVE SUMMARY

## Background

A Congestion Management Process (CMP) has been a requirement since the 2005 Safe Accountable Flexible Efficient Transportation Equity Act - A Legacy for the Users (SAFETEA-LU) federal legislation. The current Fixing America's Surface Transportation (FAST) Act and its supporting federal regulations fully maintain the requirements of the CMP with additional strategies and options. This legislation and regulations are a basis for the CMP component that is wholly incorporated in the region's long-range transportation plan, Visualize 2045. The CMP component of Visualize 2045 constitutes the region's official CMP, and serves to satisfy the federal requirement of having a regional CMP.

This CMP Technical Report serves as a background document to the official CMP within Visualize 2045, providing detailed information on data, strategies, and regional programs involved in congestion management. This 2022 CMP Technical Report is an updated version of the previously published CMP Technical Reports (2008-2020; 2022 Executive Summary and full report also available at this link).

## Components of the CMP

The National Capital Region's Congestion Management Process has four components as described in Visualize 2045:

- Monitor and evaluate transportation system performance
- Define and analyze strategies
- Compile project-specific congestion management information
- Implement strategies and assess

This report documents and provides technical details of the four components of the CMP. It compiles information from a wide range of metropolitan transportation planning activities, as well as providing some additional CMP specific analyses, particularly travel time reliability and non-recurring congestion analyses.

## Congestion on Highways

### Regional Congestion Trends, 2010-2021

Based on the results revealed by the Eastern Transportation Coalition Vehicle Probe Project (VPP)/INRIX traffic monitoring[1], peak period congestion in the Washington region decreased between 2010 and 2012, increased moderately through 2019, and then was impacted by the COVID-19 pandemic.

The congestion intensity, measured by the Travel Time Index (TTI)[2] from a traveler's perspective, decreased 6.7% between 2010 and 2012 and increased by 1.9% from 2012 to 2019 (Figure E-1). The Peak Period congestion in 2020 dropped significantly due to measures in response to the

[1] Eastern Transportation CoalitionVehicle Probe Project, https://tetcoalition.org/projects/vpp-marketplace/
[2] Travel Time Index (TTI) is an indicator of the intensity of congestion, calculated as the ratio of actual experienced travel time to free flow travel time. A travel time index of 1.00 implies free flow travel without any delays, while a travel time index of 1.30 means one has to spend 30% more time to finish a trip compared to free flow travel.

unprecedented COVID-19 pandemic. In 2021, the regional congestion intensity was still lower than those in pre pandemic years even though a rebound from 2020 was observed.

The spatial extent of congestion, measured by Percent of Congested Miles[3] from a system perspective, varied similarly to the TTI (Figure E-2). Regionally 21% of all monitored roadways were congested during peak periods in 2010. This number decreased to approximately 9% in 2013, the lowest in the last eight years, and then increased to about 14% in 2019. This region observed about 7% of all monitored roads congested during peak periods in 2021, and that was a slightly increase from 5% in 2020.

**Figure E-1: Annual Average Travel Time Index by Highway Category: Total AM and PM Peaks**

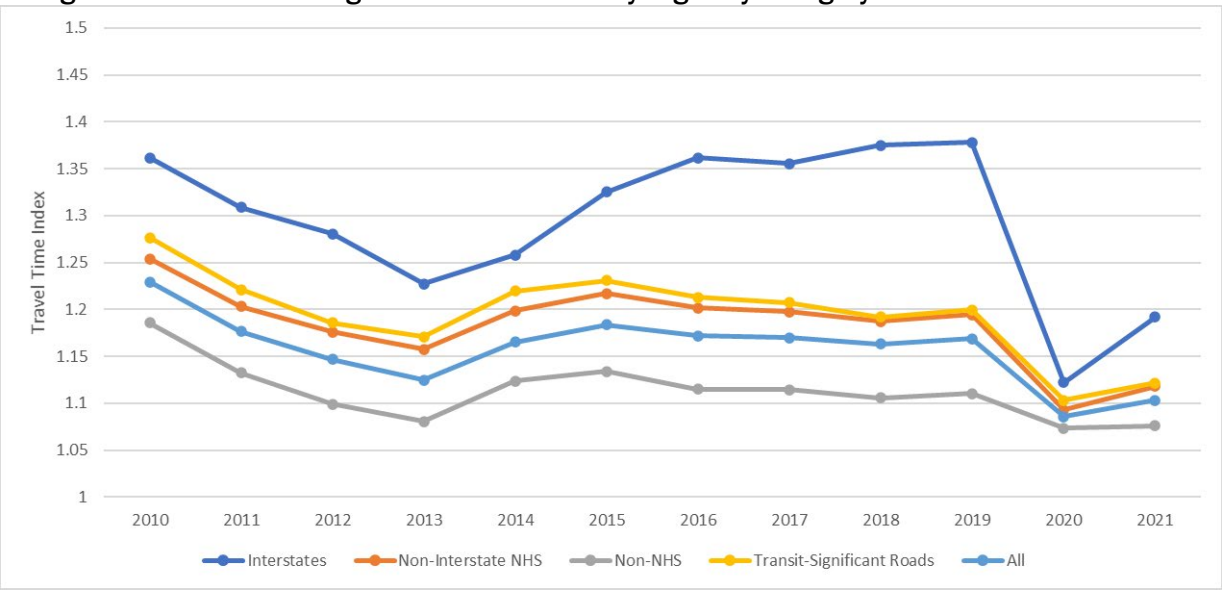
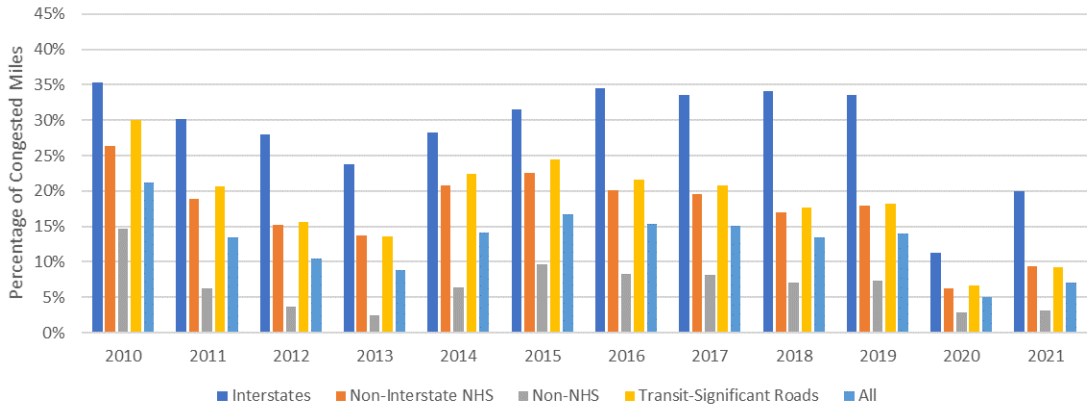



**Figure E-2: Annual Average Percent of Congested Miles by Highway Category: Total AM and PM Peaks**



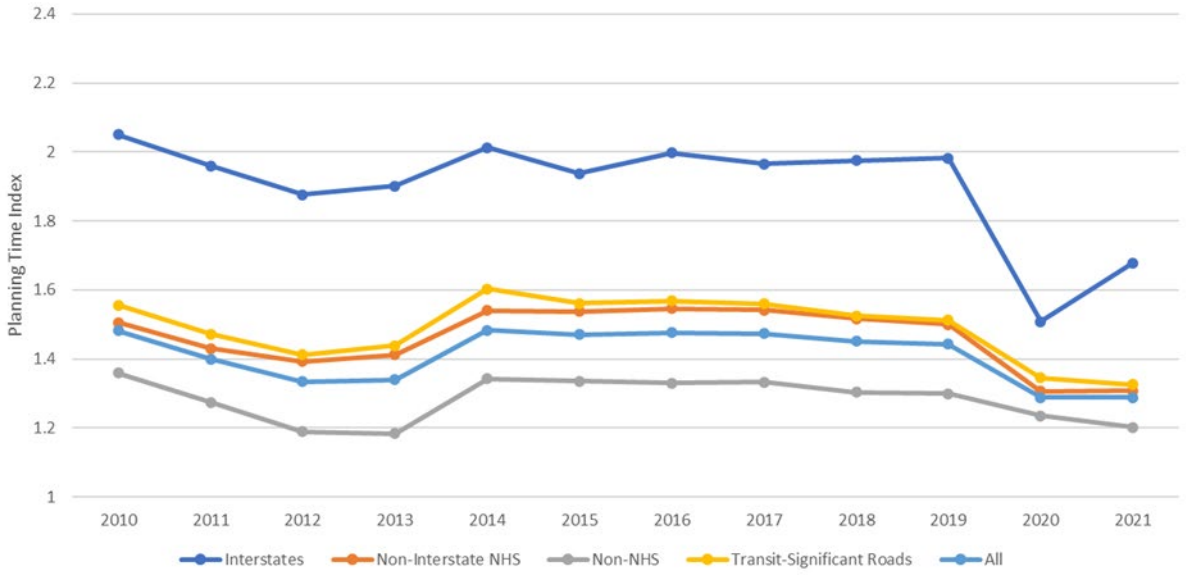

[3] Percent of Congested (Directional) Miles is a system-wide measure that captures the spatial extent of congestion. Congestion is defined if actual travel time is 30% longer than the free-flow travel time[3], i.e., Travel Time Index > 1.3, based on recommendations made by the National Transportation Operations Coalition in 2005.

## Regional Travel Time Reliability Trends, 2010-2021

Travelers in the Washington region typically will need to budget about two times the free flow travel time during peak periods to ensure on-time arrivals. These numbers are based on all directions of travel, therefore for those who traveling in the peak direction would need to budget even more.

Similar to the trends observed in traffic congestion, travel time reliability improved approximately 10% between 2010 and 2012 but has almost gone back to the 2010 level in 2014, then constantly down to slightly above 1.4 in 2019 (Figure E-3). The Peak Period travel time reliability for all monitored roads in 2020 showed significant improvement due to measures in response to the unprecedented COVID-19 pandemic. In 2021, the numbers were still better than those in pre pandemic years even though a rebound from 2020 could be observed.

**Figure E-3: Annual Average Planning Time Index by Highway Category: Total AM and PM Peaks**




## Congestion Monthly Variation

Congestion varies from month to month within a year, as shown for 2021 in Figure E-4. Monthly variations of congestion were most noticeable on the Interstate System, followed by the Transit-Significant Roads, the Non-Interstate NHS, and the Non-NHS.

In pre-COVID-19 years, the region overall had increasing congestion from January to May, then decreasing congestion through August. October had the highest level of congestion, after that, congestion kept decreasing for the rest of year. The patterns were different with COVID-19 measures implemented in 2020 and 2021. Traffic in the NCR rebounded slowly in 2021, especially those on Interstates. The pattern of dropping in August looked similar to those in pre-COVID-19 years.

## Congestion Day of Week Variation

Congestion also varies within a week (Figure E-5). Even though there were still COVID-19 measures, the two-peak pattern of congestion variation in 2021 looks similar to that in pre-COVID-19 years. The most congested PM peak was found on Friday.

Monday and Friday had unique traffic patterns in 2021. Monday morning's traffic was lower than that of the middle weekdays but higher than Friday; Monday had the least afternoon congestion among

weekdays. Friday had the least morning congestion among weekdays; Congestion on Friday afternoons was worse than all other weekdays.

Weekend days had the lowest traffic in the week and Sunday was even lower than Saturday with no pronounced AM and PM peaks. During these two days, mid-day traffic (1:00 – 3:00 pm) was the highest in the days.

**Figure E-4: 2021 Monthly Variation of Congestion: Total AM and PM Peaks**

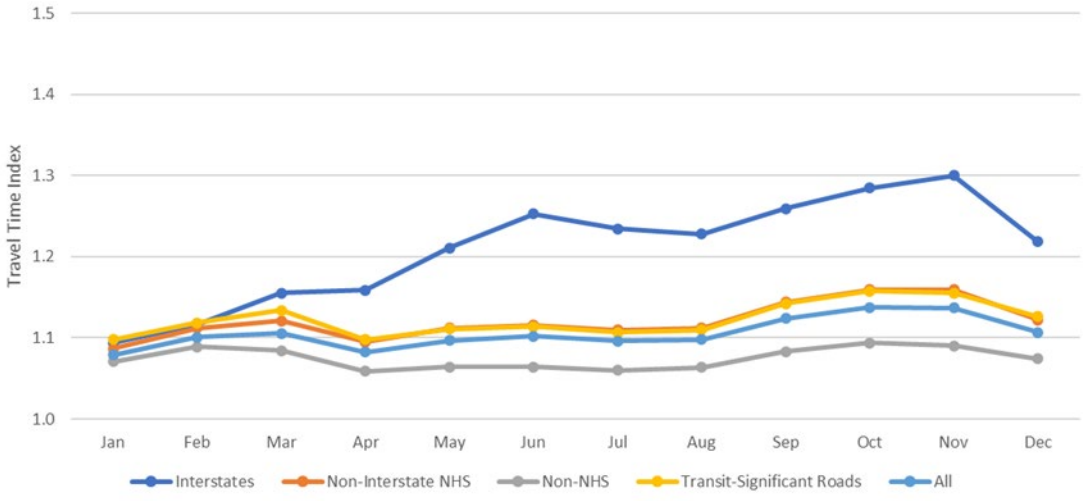
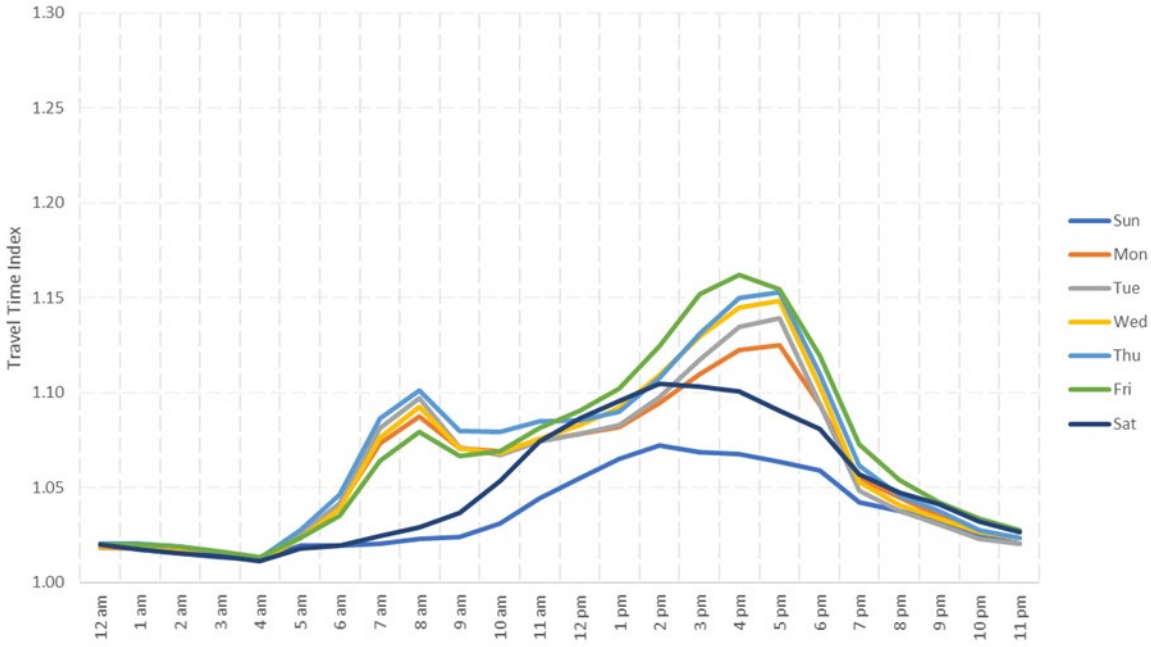



**Figure E-5: Time of Day and Day of Week Variation of Congestion in 2021**



## TOP BOTTLENECKS

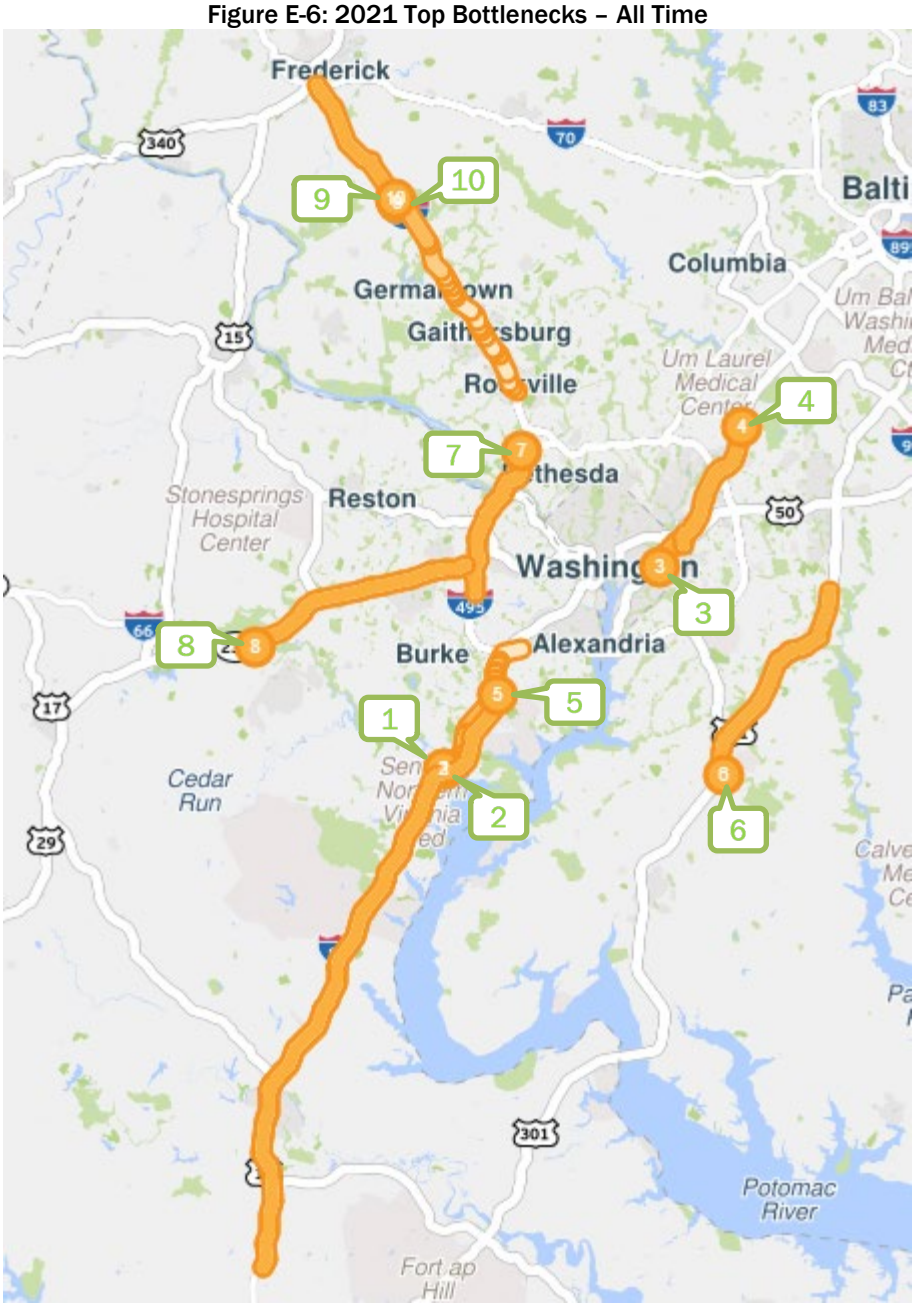
This report presents "all-time", i.e. 24/7/365, top bottlenecks by taking advantage of the Bottleneck Ranking tool in Probe Data Analytics suite of Regional Integrated Transportation Information System (RITIS) provided by the University of Maryland CATT Lab. A measure of "Base Impact", defined as the sum of queue lengths over the duration, in the tool was chosen to rank the bottlenecks for this report. The "all-time" top bottlenecks in 2021 are summarized in Table E-1 and mapped in Figure E-6.

It is worth noting that the bottleneck ranking method for this report is different from those in previous editions of CMP Technical Report. Travel Time Index (TTI) – an indicator of the intensity of congestion and the ratio of actual travel time to free flow travel time – and Annual Average Daily Traffic volume (AADT) were used as the essential factors in ranking the bottlenecks in the previous reports. While the methods are similar but ultimately different, use caution in comparing bottlenecks of this report to those reported in the previous editions.

**Table E-1: 2021 Top Bottlenecks – All Time**

| Rank | Location | Average duration | Average max length (miles) | Total duration | Impact factor |
|---|---|---|---|---|---|
| 1 | I-95 S @ VA-123/EXIT 160 | 8 h 9 m | 4.01 | 124 d 4 h 5 m | 530,457 |
| 2 | I-95 N @ VA-123/EXIT 160 | 4 h 11 m | 4.45 | 63 d 19 h 32 m | 386,481 |
| 3 | DC-295 S @ CAPITOL ST | 9 h 4 m | 1.51 | 137 d 22 h 41 m | 278,813 |
| 4 | MD-295 N @ POWDER MILL RD | 5 h 11 m | 2.92 | 78 d 19 h 59 m | 255,314 |
| 5 | I-95 N @ VA-617/BACKLICK RD/EXIT 167 | 2 h 33 m | 4.02 | 38 d 22 h 50 m | 216,574 |
| 6 | US-301 S @ MCKENDREE RD/CEDARVILLE RD | 3 h 51 m | 2.45 | 58 d 14 h 43 m | 196,300 |
| 7 | I-495 CW @ I-270-SPUR | 1 h 21 m | 5.92 | 20 d 17 h 56 m | 176,892 |
| 8 | I-66 W @ VA-234/VA-234-BR/EXIT 47 | 1 h 15 m | 6.21 | 19 d 3 h 24 m | 159,189 |
| 9 | I-270 S @ MD-109/EXIT 22 | 1 h 54 m | 3.89 | 29 d 2 h 53 m | 153,541 |
| 10 | I-270 N @ MD-109/EXIT 22 | 1 h 30 m | 4.73 | 22 d 23 h 44 m | 146,933 |

**Figure E-6: 2021 Top Bottlenecks – All Time**



### MAJOR FREEWAY COMMUTE ROUTES

In addition to the regional summaries as presented by the above performance measures, route- or corridor-specific analysis has also been carried out in this report. A total of 18 major freeway commute routes are defined between major interchanges and/or major points of interest for each peak period. Travel times along the 18 major commute routes in both directions were plotted by the "Performance Charts" tool of the VPP Suite for every Tuesday, Wednesday and Thursday in 2010 and 2019-2021, as described in Chapter 2 and Appendix C.

### CONGESTION ON ARTERIALS

Using emerging data sources such as the VPP/INRIX data, NPMRDS[4] and Bluetooth data, staff now applies such data in arterial traffic monitoring as a successor to field monitoring. Travel Time Index and Planning Time Index on all monitored roads including arterials are provided in detail in Appendices A and B.

### TRAFFIC SIGNALS

Delays occurring at signalized intersections account for a significant portion of overall arterial and urban street delays. Improving traffic signal timing has been identified as an LRP priority area.

The TPB has conducted surveys of the status of signal optimization, most recently in 2017. Similar to previous surveys, the 2017 survey found that of the approximate total of 5,900 signalized intersections in the region, 73 percent were retimed/optimized, 24 percent not retimed/optimized, and no report received for 3 percent.

The TPB has also conducted regional surveys on traffic signals power back-up systems. The last survey was conducted as of December 31, 2017 and found that about 37% of the region's 5,900 signals are equipped with battery-based power back-up systems, and 69% are equipped with generator-ready back-up systems (most battery-based systems also have generator-ready features). These power back-up systems can improve the resiliency of the transportation network.

## Congestion on Transit and Other Systems

The CMP Technical Report includes information from a variety of sources, both more recent and less recent, that have looked at congestion's interaction with a variety of issues and modes. Chapter 2 includes this detailed coverage. The following are a few highlights, especially focusing on the most recently emerging information.

### TRANSIT

The National Capital Region possesses a multimodal and diverse transit system, including Metrorail, commuter rail and a variety of bus operations. Congestion on the transit system is always one of the concerns of the CMP.

Congestion on the region's roadway network often has an impact on bus transit systems. The identified congested locations, especially those on the Washington Metropolitan Area Transit Authority's (WMATA) Priority Corridor Network and the Transit-Significant Roads as identified by the TPB's Regional Public Transportation Subcommittee (further discussed in section 2.3.1.1) are usually also bottlenecks for bus transit. Relieving roadway congestion will directly have a positive impact on

[4] National Performance Management Research Data Set (NPMRDS), https://ops.fhwa.dot.gov/perf_measurement/index.htm

bus operations, such as reducing travelers' delay, reducing bus operations cost, improving bus reliability and increasing ridership.

Congestion can also be an issue within transit. If the demand for buses, rail and train is high and the capacity cannot keep up with that demand, then transit becomes overcrowded. Metrorail crowdedness are often observed during rush hours along certain stations. Congestion also exists within certain transit stations, especially multimodal transit centers, e.g. Union Station. Station congestion is a congestion of different nature, mostly due to limitations in design and circulation as well as ridership growth. Momentum, Metro's strategic plan for 2013-2025 [5] found crowded conditions at peak periods; without rail fleet expansion, most rail lines would be even more congested by 2025.

### Managed Lanes Facilities

A number of HOV facilities in the region have been reconstructed to high occupancy toll lanes where HOVs continue to use the facility, for free whereas single occupant vehicles can use them by paying a congestion-responsive toll.

### Park-and-Ride Facilities

There are over 160,000 parking spaces at nearly 400 Park & Ride lots throughout the Washington/Baltimore Metropolitan areas where commuters can conveniently bike, walk or drive to and join up with carpools/vanpools or gain access to public transit. According to the region's Commuter Connections program: two thirds of Lots have bus or rail service available; parking is free at 89% of the Park & Ride Lots; and more than 25% of Park & Ride Lots have bicycle parking facilities.

### Airport Access

The transportation linkage between airports and local activities is a critical component of the transportation system. The Washington region has two major airports – Ronald Reagan Washington National Airport (DCA) in Arlington, VA, and Washington Dulles International Airport (IAD) in Loudoun County, VA. The region is also served by the nearby Baltimore/Washington International Thurgood Marshall Airport (BWI). According to the most recent TPB Air Passenger Survey the majority (over 90%) of those traveling to the region's airports does so via the highway network (i.e. personal cars, rental cars, taxis, buses). Therefore, understanding ground airport access is important to congestion management.

### Freight

The National Capital Region has a responsive freight system to support the vitality of economy and quality of life. This region features a consumer and service-based economy and approximately 80% of freight by weight moving into, out of and within the region is transported by truck[6].

## Future Congestion

The constrained element of Visualize 2045, the Metropolitan Washington region's long-range transportation plan, includes all regionally significant transportation projects and programs planned in the Metropolitan Washington region over the next 25-30 years. The TPB produces a performance

[5] WMATA, Strategic Plan 2013-2025, https://www.wmata.com/initiatives/strategic-plans/upload/momentum-full.pdf

[6] National Capital Region Freight Plan, July 2016
https://www.mwcog.org/documents/2010/07/28/national-capital-region-freight-plan-freight/

analysis of every long-range plan, which examines trends and assesses future levels of congestion as well as other performance measures. The performance analysis of the constrained element of Visualize 2045 provides an overall assessment of the anticipated impacts and an indication of future levels of congestion relevant to the CMP.[7]

Plan performance analyzes the outlook of growth in the region and forecasts future congestion. The plan performance analysis examines travel demand model data to identify where congestion is expected to occur now and in the future. It looks at criteria that may affect congestion, such as changes in population, employment, transit trips, auto trips, number of lane miles, and congested lane miles. The analysis breaks down lane miles of congestion by examining the total share of congested lane miles, a comparison with no-build alternative scenario, additional indicators of delay, and, generally, where the most lane miles of congestion can be found in 2045.

Between 2018 to 2045, the region is forecast to be home to 23% more residents and 29% more jobs in 2045 (Figure 2-32). Towards accommodating that growth, 8% more lane miles of roadway and 42% more high-capacity transit miles are planned to be constructed. The total number of trips taken is expected to increase by 22%, and transit, walk, and bike trips are expected to increase at a faster rate than single driver trips. The overall amount of driving (Vehicle Miles Traveled or VMT) is expected to increase by 20%. This is slightly less than forecast population growth, which means that VMT per capita is expected to decline by 3%. The increase in demand on the roadways is forecast to out-pace the increase in supply, leading to a significant increase in congestion.

## National Comparison of the Washington Region's Congestion

The Washington region is among the most congested metropolitan areas in the nation, according to three entities that perform congestion analyses across the nation, using varying methodologies. Based on yearly delay per auto commuter, the Texas A&M Transportation Institute ranked metropolitan Washington fifth-worst in the U.S. in 2020 (most recent year available) for congestion[8]. However, based on annual average hours wasted in traffic, the INRIX company ranked the Washington region 13th in 2021[9]. And based on extra travel time compared to free flow conditions, the TomTom company ranked the region the eighth in the United States in 2021[10].

## Congestion Management Strategies

The CMP has been playing an important role in developing strategies, including strategies in association with capacity-expanding projects, to combat congestion or mitigate the impact of congestion. Visualize 2045 and TPB member agencies have pursued many alternatives to capacity increases, with considerations of these strategies informed by the CMP. Implemented or continuing strategies include demand management strategies and operational management strategies, as shown in Figure E-7. It should be noted that although strategies are divided into two categories for reporting purposes in this document, demand management and operational management strategies should be designed and implemented to work in cooperation.

### Demand Management Strategies

Demand Management aims at influencing travelers' behavior for the purpose of redistributing or reducing travel demand. Examples of TPB's demand management strategies include:

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[7] TPB, Visualize 2045 Documentation, October 17, 2018. https://www.mwcog.org/visualize2045/document-library/
[8] https://mobility.tamu.edu/umr/.
[9] INRIX, Inc., Traffic Scorecard, http://inrix.com/scorecard/
[10] TomTom, Traffic Index, https://www.tomtom.com/en_gb/trafficindex/list

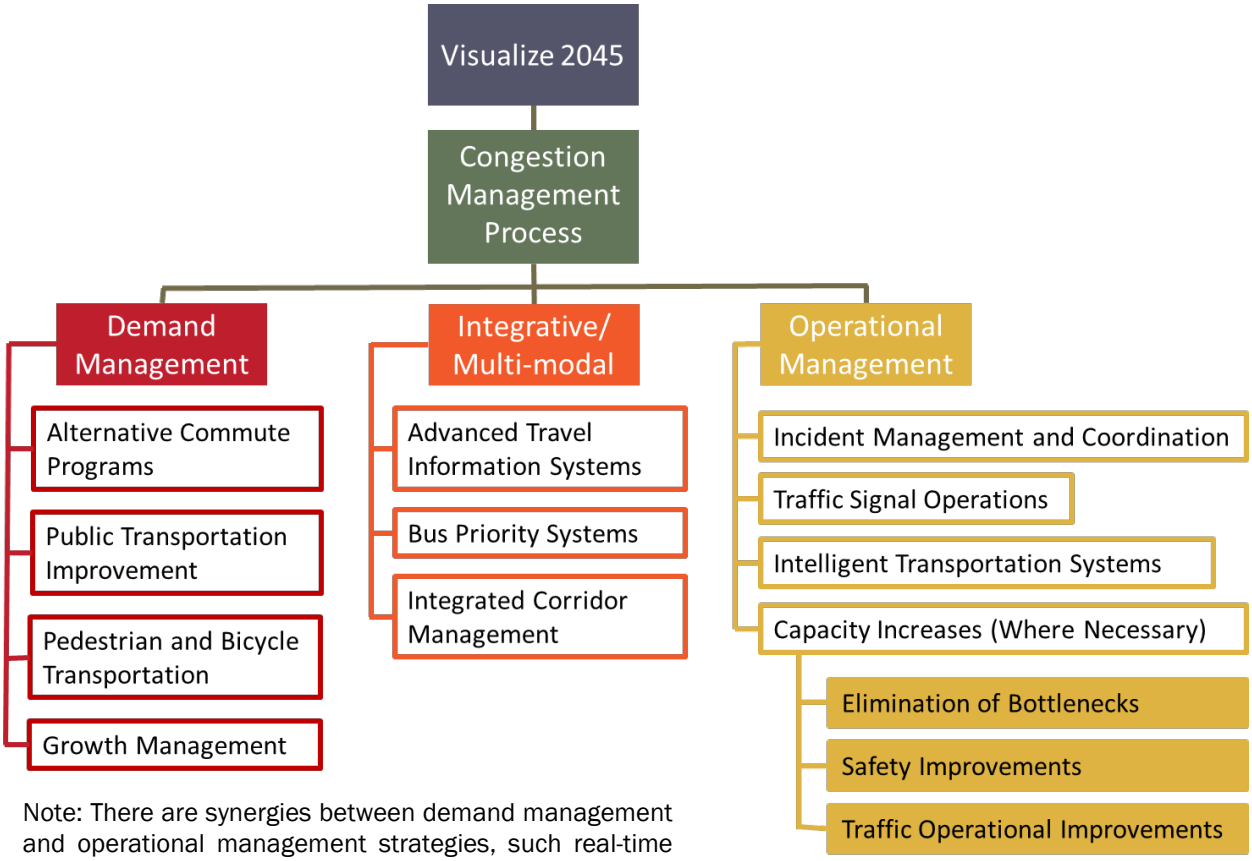
- Commuter Connections Program – Including strategies such as Telework, Employer Outreach, Guaranteed Ride Home, Live Near Your Work, Carpooling, Vanpooling, Ridematching Services, Car Free Day, and Bike To Work Day.
- Promotion of local travel demand management – Local demand management strategies are documented in the main body of the CMP Technical Report.
- Public transportation improvements – The Washington region continues to support a robust transit system as a major alternative to driving alone.
- Pedestrian and bicycle transportation enhancements as promoted and tracked through the Bicycle and Pedestrian Planning program – The number of bicycle and pedestrian facilities in the region has increased in recent years; the regional bikesharing program, Capital Bikeshare has more than 5,000 bikes available at 600 stations across six jurisdictions: Washington, DC; Arlington, VA; Alexandria, VA; Montgomery County, MD; Prince George's County, MD; Fairfax County, VA; and the City of Falls Church, VA.
- Car sharing - Local governments work with private companies to make the region's car sharing market viable.
- Land use strategies – Including those promoted by the Transportation-Land Use Connections (TLC) Program.

### OPERATIONAL MANAGEMENT STRATEGIES

Operational management focuses on improvements made to the existing transportation system to keep it functioning effectively. Examples of TPB's operational management strategies include:

- Managed Lanes Facilities, which can include high-occupancy vehicle facilities (such as on US-50 and the Dulles Toll Road) and variably-priced facilities (such as on I-66 and I-495).
- Incident Management – The region's state DOTs all pursue strategies for managing their transportation systems, including operation of 24/7 traffic management centers, roadway monitoring, service patrols, and communications interconnections among personnel, centers and systems.
- Regional Transportation Operations Coordination – Notably the Metropolitan Transportation Operations Coordination (MATOC) program, whose development the TPB helped shepherd, uses real-time transportation systems monitoring and information sharing to help mitigate the impacts of non-recurring congestion.
- Intelligent Transportation Systems are considered, particularly through the SPOTS committee. Examples include traffic signal optimization, adaptive traffic signal systems, safety service patrols, drone technology for accident reconstruction and traveler information.

**Figure E-7: Major CMP Strategies**




Note: There are synergies between demand management and operational management strategies, such real-time traveler information on ridesharing opportunities responsive to a real-time traffic incident or situation.

## INTEGRATED/MULTI-MODAL STRATEGIES

While there is often overlap in demand management and operational management strategies, for example, real-time traveler information on ridesharing opportunities responsive to a real-time traffic incident or situation, there are projects in the region that fully integrate demand and operational management strategies.

- Integrated Corridor Management - MDOT and VDOT have instituted ICM efforts in major corridors.
- Advanced Traveler Information Systems – Travelers have more ways than ever for obtaining trip planning information such as traffic, incidents, real-time transit arrivals, and emergency information. The prevalence of internet capable mobile devices and social media provide new means of communication between travelers and operators.
- I-270 Innovative Congestion Management Project – MDOT's FY 2020-2025 Consolidated Transportation Program (CTP) includes the I-270 Innovative Congestion Management (ICM) project to implement a series of roadway and technology-based improvements on I-270. The project would contain both roadway improvements and innovative technology and techniques to achieve the goal.

### ADDITIONAL SYSTEM CAPACITY

Federal law and regulations list capacity increases as another possible component of operational management strategies, for consideration in cases of elimination of bottlenecks, safety improvements and/or traffic operational improvements. These capacity increase projects are documented in CLRP or TIP.

There have been relatively few capacity increase projects in recent years, however. This region has an emphasis on demand and operational management strategies, such us transit improvements, the Commuter Connections program and the strategies developed by the System Performance, Operations and Technology Subcommittee (SPOTS).

## Assessment of Congestion Management Strategies

### ASSESSMENT OF IMPLEMENTED STRATEGIES

The TPB assesses the implemented congestion management strategies in a variety of ways. Many strategies have specific assessments and the overall effectiveness of all strategies is repeatedly evaluated by congestion monitoring and analysis.

Specific assessments (of individual or several strategies):

- A variety of surveys within the Commuter Connections Program are regularly conducted to provide firsthand data inputs for the assessments, including the Guaranteed Ride Home Customer Satisfaction Survey, Commuter Connections Applicant Placement Rate Survey, State of the Commute Survey, Employee Commute Surveys, Carshare Survey, Vanpool Driver Survey, Employer Telework Assistance Follow-up Survey, and the Bike-to-Work Day Participant Survey.
- Public transportation improvements, pedestrian and bicycle transportation improvements, and land use strategies are assessed in Regional Household Travel Surveys, and Regional Travel Trends Reports.

Overall assessments (of all implemented strategies):

a) Eastern Transportation Corridor Coalition probe-vehicle-based traffic monitoring data.
b) National Performance Management Research Data Set (NPMRDS).
c) Maryland, Virginia and the District of Columbia's Highway Performance Monitoring Systems (HPMS).

### ASSESSMENT OF POTENTIAL STRATEGIES THROUGH SCENARIO PLANNING

The TPB has conducted scenario planning studies over the years. The three most recent scenario studies are the Long Range Plan Task Force Report which identified seven initiatives for inclusion in the visualize 2045, and the Multi-sector Working Group identified projects in the transportation and land use sector with the aim of reducing greenhouse gases, and the TPB Climate Change Mitigation Study of 2021 which included three “top-down” scenarios and 10 “bottom-up” scenarios exploring single and combination pathways to reduce on-road, transportation-sector greenhouse gas emissions.

The TPB has also undertaken the Transportation/Land Use Connections (TLC) Program. The TLC Program addresses the “how to” challenges related to improving transportation/land-use coordination and realizing an alternative future for the region, through providing both direct technical assistance and information about best practices and model projects.

TPB also has assessed special potential strategies on an as-needed basis.

## Compiling Project-Specific Congestion Management Information

Pursuant to Federal regulations, the TPB encourages consideration and inclusion of congestion management strategies in all Single Occupancy Vehicle (SOV) capacity-increasing projects. This involves compiling and analyzing information in the Technical Inputs Solicitation Congestion Management Documentation Forms, which are submitted from regional agencies when the long-range transportation plan is developed.

The Call for Projects documentation requests any project-specific information available on congestion that necessitates or impacts the proposed project. Agencies compile this information from various sources, including TPB-published congestion information (if available), internal or other directly measured information, or by conducting engineering estimates of the Level of Service (LOS). TPB compiles and analyzes this submitted information, along with information from other CMP sources.

Specifically for SOV capacity-increasing projects, the TPB requests documentation that the implementing agency considered all appropriate systems and demand management alternatives to the SOV capacity. In the Call for Projects documentation a special set of SOV questions is completed by implementing agencies and the TPB compiles this information.

## Key Findings of the 2022 CMP Technical Report

1. Congestion – Impacts of the COVID-19 pandemic dramatically decreased congestion in the Washington region, with the Travel Time Index being much lower/better (1.17 in 2020 and 1.28 in 2021, in weekday TTI) than at any time since vehicle probe data became available for analysis in 2010. Congestion in 2021 did increase versus 2020, but was still dramatically lower than historic norms. (Sections 2.2.1.1 and 2.2.1.3).

2. Reliability – Travel time reliability (as measured by Planning Time Index) in the region improved in 2020 and 2021 versus historic norms, reflecting significantly decreased congestion due to pandemic impacts (Section 2.2.1.2).

3. Bottlenecks – Bottleneck locations in the region did change somewhat due to pandemic impacts compared to the 2019 bottlenecks reported in the 2020 CMP Technical Report, though many of the region's historic bottlenecks remained in 2021. A segment of I-95 southbound between US-1/EXIT 161 and VA-123/EXIT 160 was ranked the first bottleneck in 2021, as it was in 2019. (Section 2.2.1.6).

4. Travel Demand Management – Travel demand management continues to be an important tool for day-to-day congestion management. The Commuter Connections program remains the centerpiece to assist and encourage people in the Washington region to use alternatives to the single-occupant automobile. The transit system in the Washington region serves as a major alternative to driving alone – transit mode share is among the highest several metropolitan areas in the country (Section 3.2.1).

5. Walking and Bicycling – Walking and bicycling continue to grow in the region in part due to bikesharing and carsharing options and increasing connectivity in the bicycle and pedestrian network (Sections 3.2.4 and 3.2.5).

6. Variably Priced Lanes (VPLs) - VPLs provide additional options to travelers in the region. Facilities include 95Express, 395Express, 495Express, I-66, and Maryland Route 200 (Intercounty Connector (ICC)) (Section 3.3.2).

7. Regional Transportation Operations Coordination – The Metropolitan Washington Area Transportation Operations Coordination (MATOC) continues to play an important role in coordination and communicating incident information during both typical travel days and special events such as severe weather and construction work (Section 3.3.3.4).

8. Real-time travel information – The increasing availability of technology to monitor, detect, and evaluate travel conditions allows operators to make changes to the transportation network through active travel demand management, traffic signal optimization, and integrative corridor management. For travelers, real-time traffic and transit information are available from a number of sources though mobile applications and mobile versions of websites. Social media provides a mutually beneficial direct connection between transportation providers and users. Mobile applications related to non-auto modes, such as bikesharing and carsharing, allow travelers to be flexible with their mode choices (Section 3.4.6).

9. COVID-19 Pandemic Impacts – Beginning in March 2020, the COVID-19 pandemic had dramatic impacts on travel and transportation in the Washington region (as well as nationally). Among the transportation impacts reported were dramatic increases of telework, reduced transit ridership, increased freight movement, and increased home delivery of goods. It remains to be seen what these trends will be over the longer term, as recovery from the pandemic evolves. (Sections 2.2.1.1 and 2.2.1.2; Section 2.2.3; Section 2.3).

## Recommendations for the Congestion Management Process

The 2022 CMP Technical Report documents the updates of the Congestion Management Process in the Washington region. Looking forward, the report leads to several important recommendations for future improvements.

1. **Continue the Commuter Connections program.** The Commuter Connections program is a primary key strategy for demand management in the National Capital Region and it is beneficial to have a regional approach. Meanwhile, this program in addition to reducing trips and vehicle miles of travel, reduces transportation emissions and improves air quality.

2. **Continue and enhance the MATOC program and support agency/jurisdictional transportation management activities.** The MATOC program/activities are key strategies of operational management in the National Capital Region. Recent enhancements have including efforts on severe weather mobilization and construction coordination. Future enhancements of the MATOC program should be considered when appropriate to expand the function and participation of the program.

3. **Continue to coordinate PBPP with the CMP.** Performance measurement and analysis are key components of both requirements, and can be accomplished synergistically.

4. **Continue to encourage integration of operations management and travel demand management components of congestion management for more efficient use of the existing transportation network.** State DOTs are encouraged to continue to explore ATM strategies along congested freeways and actively manage arterials along freeways. Transportation agencies (including transit agencies) and stakeholders are encouraged to work collaboratively along congested corridors.

5. **Pursue sufficient investment in the existing transportation system, which is important for addressing congestion.** Prioritizing maintenance for the existing transportation system as called for in TPB's Regional Transportation Priorities Plan is critical to congestion management.

6. **Continue variable pricing and other management strategies in conjunction with capacity increasing projects.** Variably priced lanes (VPLs) provide an option to avoid congestion for travelers and an effective way to manage congestion for agencies.

7. **Continue to encourage transit in the Washington region and explore transit priority strategies.** The transit system in the Washington region serves as a major alternative to driving alone, and it is an important means of getting more out of existing infrastructure. Local jurisdictions are encouraged to work closely with transit agencies to explore appropriate transit priority strategies that could have positive impacts on travelers by all modes.

8. **Encourage implementation of congestion management for major construction projects.** The construction project-related congestion management has been very successful in the past such as for the 11th Street Bridge and Northern Virginia Megaprojects.

9. **Continue to encourage access to non-auto travel modes.** The success of the Capital Bikeshare program and the decrease in automobile registrations in the District of Columbia indicate that there is a shift, at least in the urban areas, to non-automobile transportation.

10. **Continue and enhance providing real-time, historical, and multimodal traveler information.** Providing travelers with information before and during their trips can help them to make decisions to avoid congestion and delays and better utilize the existing road and transit infrastructure. Share travel/incident information and/or partner with private sector providers of travel and navigation information, including information on multi-modal alternatives to driving.

11. **Encourage implementation of projects, programs, and processes that support the TPB Aspirational Initiatives.** The TPB included seven Aspirational Initiatives in the aspirational element of Visualize 2045 for future concerted action. These initiatives, if funded and enacted, would have the potential to significantly improve the region's transportation system performance compared to current plans and programs, offering a broad range of congestion management benefits.

12. **Encourage connectivity within and between Regional Activity Centers.** The recent refinement of the Regional Activity Centers map, adopted in 2013, helps coordinate transportation and land use planning for future growth. Geographically-focused Household Travel Surveys can collect data which allows planners to see local level travel patterns and behaviors impacting mode shifts.

13. **Continue and enhance the regional congestion monitoring program with multiple data sources.** There are a wealth of sources, both public and private sector, for data related to congestion which have their individual strengths and shortcomings. Private sector probe-based monitoring provides unprecedented spatial and temporal coverage on roadways, but still needs to be supplemented with data from other sources including data on traffic volumes and traffic engineering considerations. There should be continual review of the quality and availability of data provided by different sources and the structuring of a monitoring program in way that is adaptable for potential future changes in data reporting and/or data sources.

14. **Monitor trends in freight, specifically truck travel.** Interrelationships between freight movement and congestion differ from interrelationships between passenger travel and congestion.

15. **Participate in collaborative planning connected and autonomous vehicle readiness.** These emerging technologies will dramatically alter future transportation planning. Standards and interoperability are critical issues and should be addressed through extensive collaboration with a variety of stakeholders.

16. **Monitor impacts of and interactions with shared mobility services.** Transportation Network Companies (TNCs) continue to have an evolving impact on a variety of aspects of congestion management, mode share, and transportation overall, but data for regional analysis remain scarce. Regulating agencies are encouraged to arrange for TNC data to be collected and shared with the TPB and other official transportation planning and operating entities, to enable analysis of impacts.

17. **Encourage Traffic Incident Management (TIM).** COG's 2018 creation of its Traffic Incident Management Enhancement (TIME) initiative highlighted the importance of TIM within congestion management. Continued TIM efforts will be beneficial to the region.

National Capital Region
**Transportation Planning Board**

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