CONGESTION MANAGEMENT PROCESS UPDATE

And Twelve-Year Bottleneck Analysis

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Transportation Planning Board
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Agenda Item 9

National Capital Region
Transportation Planning Board

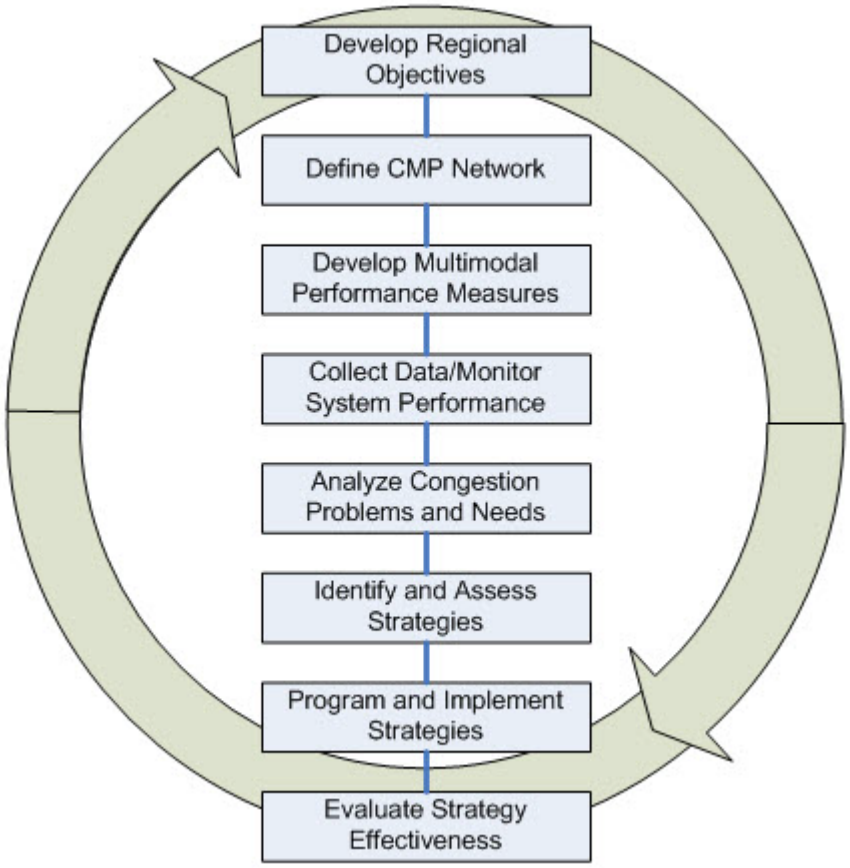
Introduction

- A Congestion Management Process (CMP) is a requirement in metropolitan transportation planning
    - Many generations of federal regulations for metropolitan planning (including IIJA/BIL) have maintained a CMP requirement
- Our official regional CMP component is wholly integrated into the overall long-range transportation plan (Visualize 2045)
- In addition, a CMP Technical Report has been developed as a supporting document biennially since 2008
- Today's presentation will look at:
    - The overall need for a CMP
    - The 2022 CMP Technical Report
    - The associated 12-year bottlenecks analysis

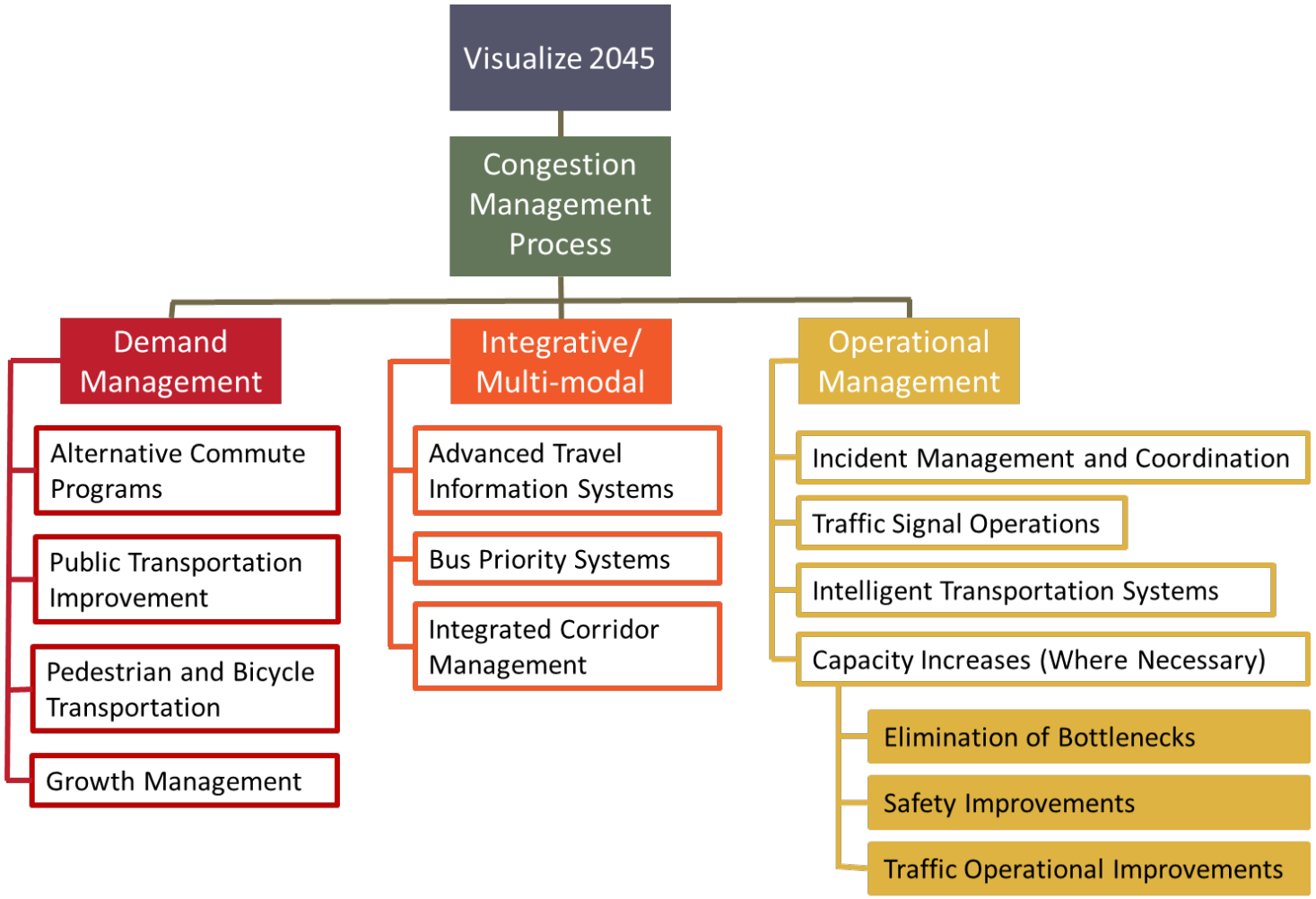
What Is a CMP?

The transportation planning process in a TMA shall **address congestion management through a process** that provides for safe and effective integrated management and operation of the multimodal transportation system…**through the use of travel demand reduction…job access projects, and operational management strategies**.

- Federal Register Vol. 81, No.103, pp.34152, May 27, 2016.



Congestion Management Strategies



Components of the Region's CMP

1. Visualize 2045 comprises the official regional CMP
   - Chapter 8 and Appendix E
   - Project-specific CMP addressed in Technical Inputs Solicitation
2. National Capital Region Congestion Reports (quarterly dashboard)
3. Biennial CMP Technical Reports
4. Special studies as needed

CMP in Visualize 2045

1. Chapter 8 – Planning for Performance (pp. 193-195)
   - TPB ensures that the plan includes alternatives to SOV
2. Appendix E – Federal Compliance and Impact on Plan Development
   - The CMP informs the project selection process for the plan and Transportation Improvement Program (TIP)

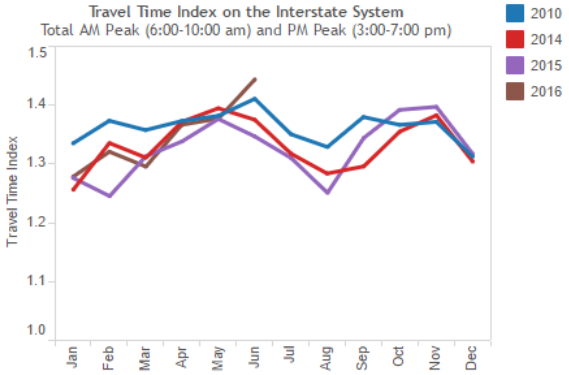
Dashboard

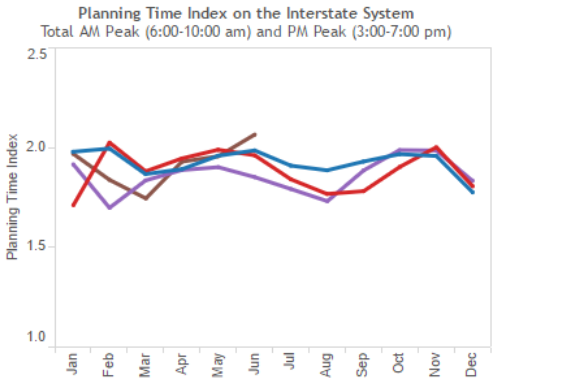
Home > Transportation > Data & Tools > Congestion Dashboard

TRANSPORTATION

Congestion Dashboard

Regional Trends

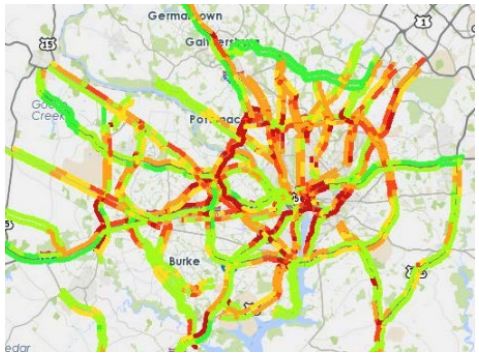




Quarterly updated NCR Congestion Report at:

https://www.mwcog.org/congestion/

Rank	Location	Average duration	Average max length (miles)	Occurrences	Impact factor*
1	I-66 W @ VA-234/EXIT 47	2 h 36 m	11.23	109	190,919



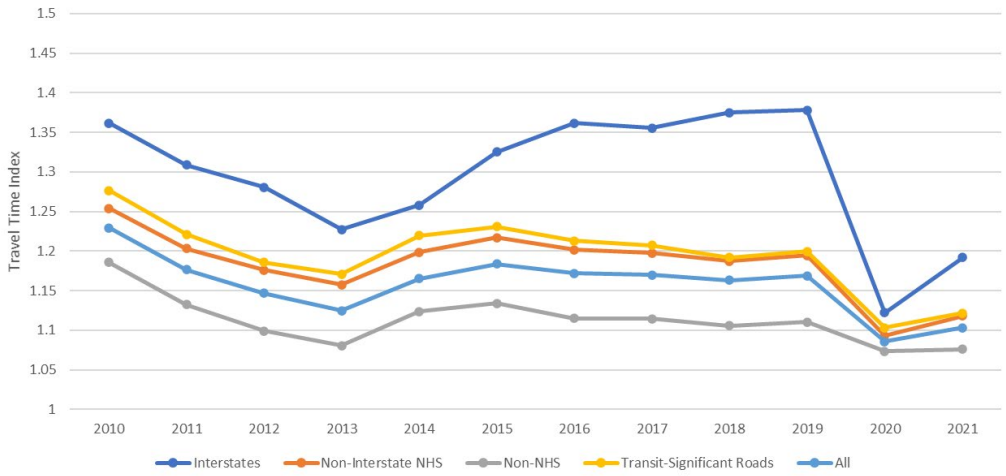
CMP Technical Report (Biennial)

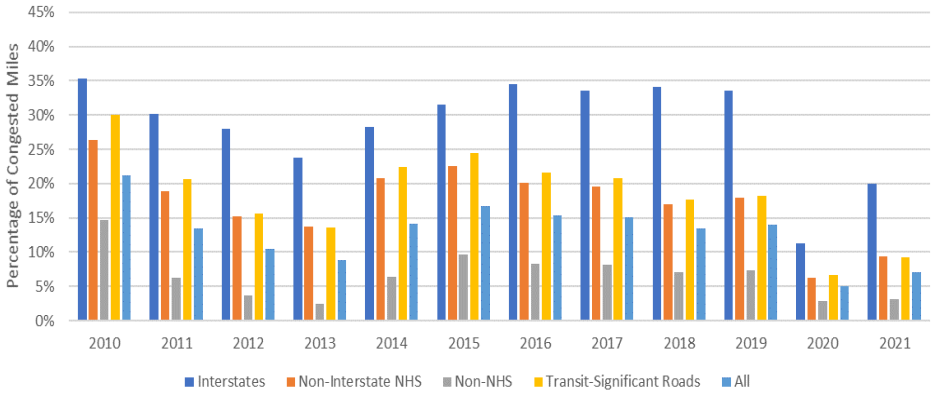
CMP Technical Report serves as a background document to the official LRP/CMP, providing detailed information on data, strategies, and regional programs involved in congestion management:

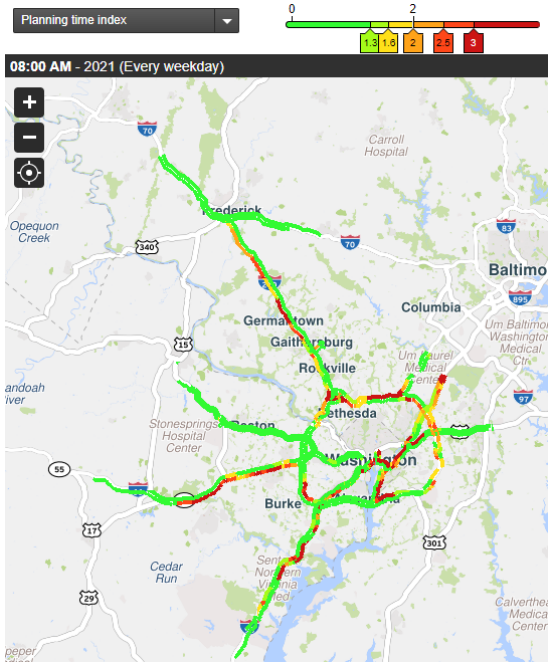
- Compiles information from a wide range of metropolitan transportation planning activities
- Provides some additional CMP-specific analyses, particularly Vehicle Probe Project data-based analyses

Congestion Management Strategies

Congestion Analyses in CMP Report







CMP Technical Report Key Findings

1. Congestion analysis
2. Reliability analysis
3. Bottlenecks
4. Travel demand management continues its importance
5. Walking/biking continue to grow
6. Variably priced lanes offer travel options
7. Regional Transportation Operations Coordination (e.g. MATOC)
8. Real-time travel information
9. COVID-19 Pandemic Impacts

Report Recommendations (1 of 2)

1. Continue the Commuter Connections program
2. Continue the MATOC program
3. Continue to coordinate PBPP with the CMP
4. Encourage integration of operations and travel demand management components of congestion management
5. Pursue sufficient investment in the existing transportation system
6. Consider variable pricing and other management strategies
7. Encourage transit and explore transit priority strategies
8. Encourage congestion management during major construction projects
9. Encourage access to non-auto travel modes

Report Recommendations (2 of 2)

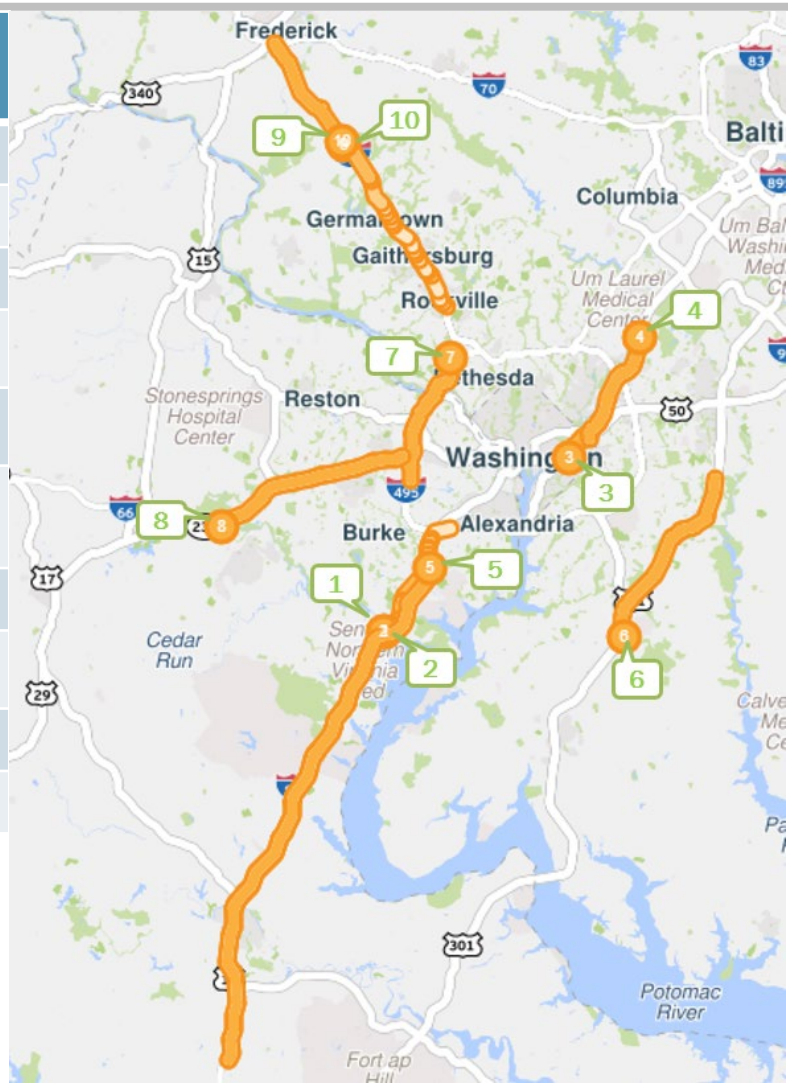
10. Continue and enhance traveler information
11. Encourage implementation of projects, programs, and processes that support the TPB Aspirational Initiatives
12. Encourage connectivity within and between Regional Activity Centers
13. Continue and enhance the regional congestion monitoring program with multiple data sources
14. Monitor trends in freight, specifically truck travel
15. Participate in collaborative planning connected and autonomous vehicle readiness
16. Monitor impacts of and interactions with shared mobility services
17. Encourage Traffic Incident Management (TIM)

National Comparison

Texas A&M Transportation Institute (2020 data)			INRIX Traffic Scorecard (2021 data)			TomTom Traffic Index (2021 data)		
Annual Person-Hours of Delay per Auto Commuter			**Hours Lost in Congestion**			**Extra Travel Time compared to Free Flow Conditions**		
Metro Area	Value	Rank	Metro Area	Value	Rank	Metro Area	Value	Rank
New York	56	1	Chicago	104	1	New York	35%	1
Boston	50	2	New York	102	2	Los Angeles	33%	2
Houston	49	3	Philadelphia	90	3	Miami	28%	3
Los Angeles	46	4	Boston	78	4	Baton Rouge	27%	4
San Francisco	46	4	Miami	66	5	San Francisco	26%	5
Washington	42	5	San Francisco	64	6	Chicago	24%	6
Dallas	40	6	New Orleans	63	7	Honolulu	23%	7
Chicago	39	7	Los Angeles	62	8	Seattle	23%	7
Atlanta	37	8	Houston	58	9	Riverside	23%	7
Philadelphia	37	8	**Washington**	44	13	**Washington**	21%	8

Location of Top 10 Bottlenecks in 2021

Location	Impact factor*
I-95 S @ VA-123/EXIT 160	530,457
I-95 N @ VA-123/EXIT 160	386,481
DC-295 S @ E CAPITOL ST	278,813
B/W PKWY N @ POWDER MILL RD	255,314
I-95 N @ VA-617/BACKLICK RD/EXIT 167	216,574
US-301 S @ MCKENDREE RD/CEDARVILLE RD	196,300
I-495 IL @ I-270-SPUR	176,892
I-66 W @ VA-234/VA-234-BR/EXIT 47	159,189
I-270 S @ MD-109/EXIT 22	153,541
I-270 N @ MD-109/EXIT 22	146,933



*Base impact - the sum of queue lengths over the duration

Source: TPB analysis of University of Maryland Probe Data Analytics Suite data.

Initiation of 12-Year Bottleneck Analysis

- There was a bottlenecks analysis methodology change for the 2022 report compared to previous reports (2020 and prior), making comparison difficult
- In lieu of comparison with previous reports, staff initiated a new 12-year analysis as a look back
- This also helped us address questions about persistent versus short-lived bottleneck locations, comparative severity, and trends
- Analysis conducted in fall 2022 for twelve one-year periods (2010 to 2021)

Bottlenecks Analysis Tool*

- Analyzed vehicle probe data (speeds) for a set of network links
- Regionally about 14,000 roadway links were available for analysis
  - Data not available for minor roads/streets
  - Data caveats for certain facilities (e.g., reversible lanes; parallel paid/free/HOV lanes)
- The tool produces a ranking table and maps of bottlenecks
- Examined options within the bottleneck tool for weighting by different factors
  - "Base Impact" confirmed as the chosen option
  - Other options generate different results/rankings!

*Bottleneck Ranking Tool, Probe Data Analytics (PDA) Suite, Regional Integrated Transportation Information System (RITIS), University of Maryland

History of 2021 Bottlenecks

Rankings for each individual year 2010-2021

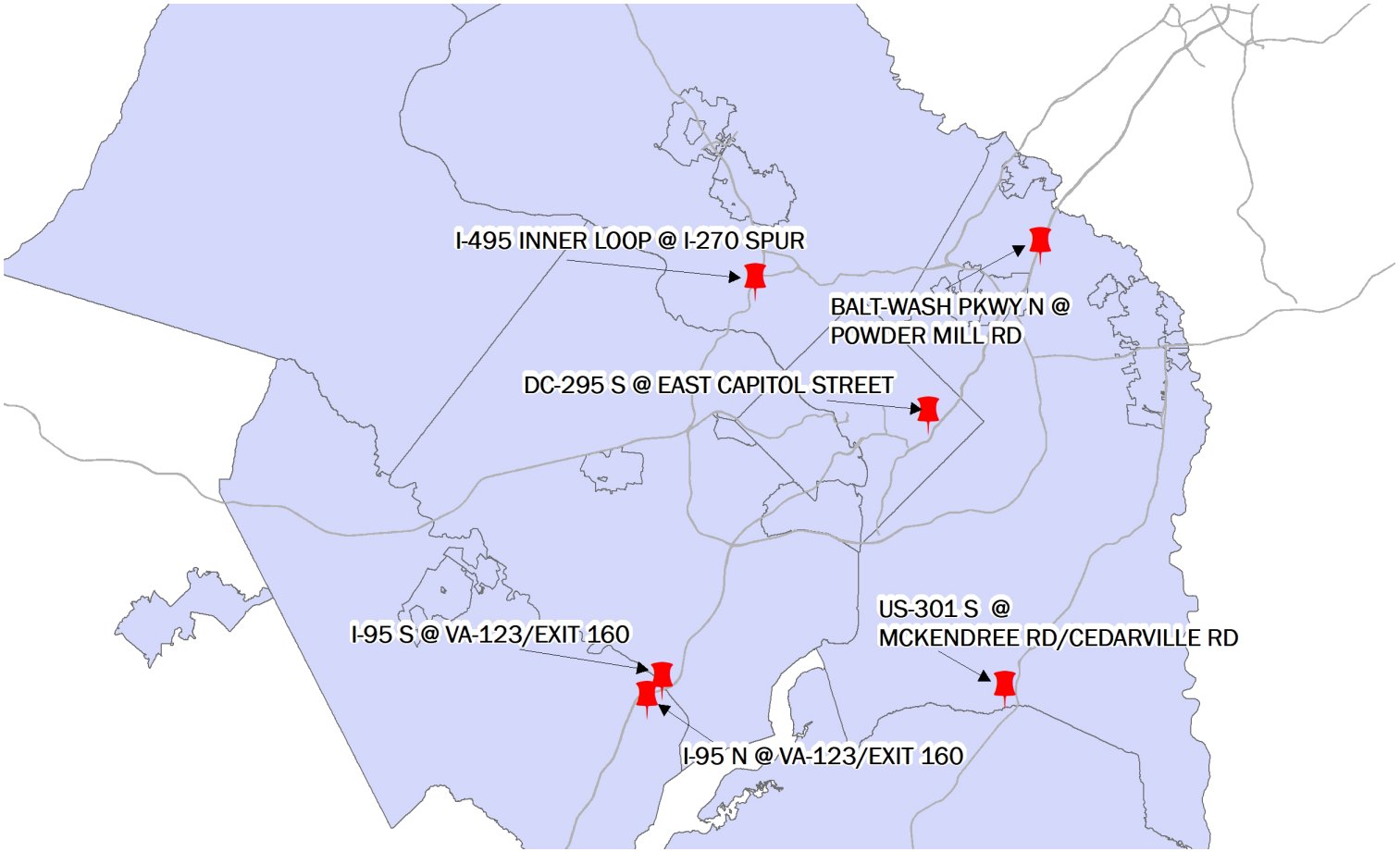
2021 Rank	Location	Highest Rank 2010-2021	Lowest Rank 2010-2021	Number of Times in Annual Top Ten 2010-2021
1	I-95 S @ VA-123/EXIT 160	1	1	12
2	I-95 N @ VA-123/EXIT 160	2	>100*	8
3	DC-295 S @ EAST CAPITOL ST	2	>100*	7
4	BALT-WASH PKWY N @ POWDER MILL RD	2	6	10
5	I-95 N @ VA-617/BACKLICK RD/EXIT 167	5	>100*	1
6	US-301 S @ MCKENDREE RD/CEDARVILLE RD	3	31	10
7	I-495 INNER LOOP @ I-270-SPUR	2	>100*	8
8	I-66 W @ VA-234/VA-234-BR/EXIT 47	3	66	3
9	I-270 S @ MD-109/EXIT 22	9	35	2
10	I-270 N @ MD-109/EXIT 22	10	>100*	1

*Anomalous values for a given year may indicate data glitches rather than actual conditions.

Persistent & Past Bottlenecks

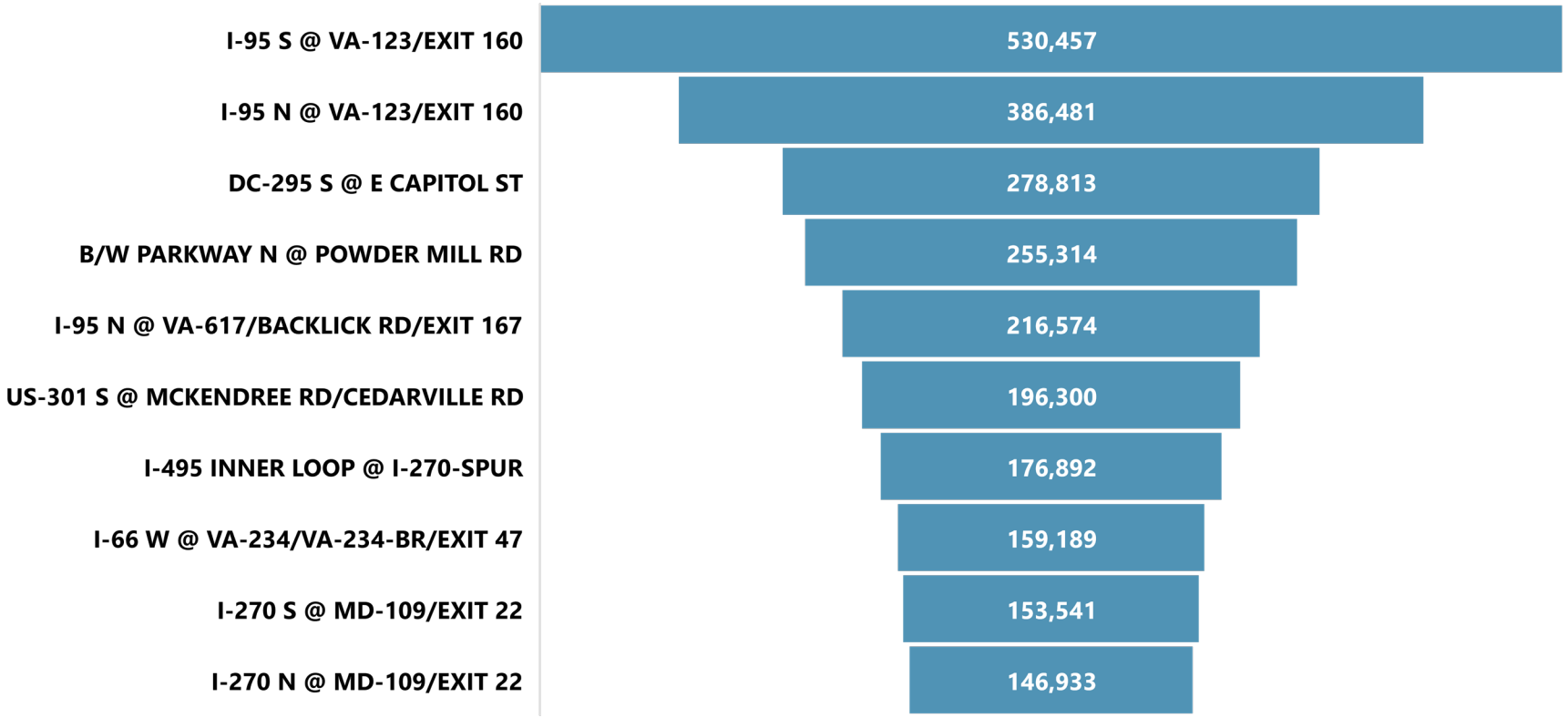
Persistent Bottleneck Locations	Highest Rank 2010-2021	2021 Rank	Number of Times in Annual Top Ten 2010-2021
I-95 S @ VA-123/EXIT 160	1	1	12
BALT-WASH PKWY N @ POWDER MILL RD	2	4	10
US-301 S @ MCKENDREE RD/CEDARVILLE RD	3	6	10
I-95 N @ VA-123/EXIT 160	2	2	8
I-495 INNER LOOP @ I-270-SPUR	2	7	8
DC-295 S @ EAST CAPITOL ST	2	3	7
Past Bottleneck Locations	**Highest Rank 2010-2021**	**2021 Rank**	**Number of Times in Annual Top Ten 2010-2021**
I-66 E @ SYCAMORE ST/EXIT 69	2	>100	10
I-495 OUTER LOOP @ MD-97/GEORGIA AVE/EXIT 31	4	44	10
I-95 S @ MCB QUANTICO/EXIT 148	2	>100	5
I-66 W @ VADEN DR/EXIT 62	3	>100	4

2010-2021 Persistent Bottlenecks Map



Source: TPB analysis of University of Maryland Probe Data Analytics Suite data.

Bottleneck Magnitudes (2021)



2021's top bottleneck was 37% more impactful than the second-ranked bottleneck, and more than three times as impactful as the 10th-ranked bottleneck

Source: TPB analysis of University of Maryland Probe Data Analytics Suite data.

Why Bottlenecks May Change Over Time

- Temporary impacts of construction zones
- Long-term impacts after construction projects
- Regional and national population and business growth
- Regional and national economic ups and downs
- Year-to-year variations in the impacts of storms and major incidents
- Still-evolving long-term travel demand impacts of the pandemic
- Changes within the PDA Suite tool and its underlying databases

Some Major Projects 2010-2021

- 2011: MD-200 (InterCounty Connector) (east end connection to US-1 completed 2014); included I-95 interchange
- 2012: 495Express lanes between VA-620 and north of VA-267
- 2012/2013: Woodrow Wilson Bridge approaches (main bridge was completed 2009)
- 2013: 11th Street Bridge
- 2014: Silver Line Metro to Wiehle–Reston East
- 2014: 95Express reversible lanes from VA-294 to VA-610
- 2017: I-66 inside the Beltway converted from HOV to HOV/toll lanes
- 2019: 395Express reversible lanes from Turkeycock Run to Potomac River

Bottlenecks Context: Range of the CMP

- Bottlenecks analysis is not the only way that the CMP Technical Report examines the extent of congestion – also reported are:
  - Congestion, reported as Travel Time Index (see mwcog.org/congestion for definition)
  - Reliability, reported as Planning Time Index
  - Travel time along defined major commute routes and designated arterial roadways
- The report also describes the many congestion management strategies pursued in the region, featuring Commuter Connections
- Commuter Connections recently updated their list of locations eligible for an incentive program based on the 12-year bottlenecks analysis
- In summary, the CMP informs TPB planning, Visualize 2045/2050, and Commuter Connections

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