National Capital Region Transportation Planning Board
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MEMORANDUM

Item #9
TPB Technical Committee
June 6, 2014

May 30, 2014

TO: TPB Technical Committee

FROM: Wenjing Pu
Department of Transportation Planning

SUBJECT: Review of the Draft 2014 Congestion Management Process (CMP) Technical Report

Background

The Congestion Management Process (CMP) is a federal requirement for transportation planning in metropolitans with population of 200,000 or more. The CMP component (www.mwcog.org/cmp) of the Constrained Long-Range Plan (CLRP) constitutes the region's official CMP, and serves to satisfy the federal requirement of having a regional CMP. The CMP Technical Report serves as a background document to the official CLRP/CMP, providing detailed information on data, analysis, strategies, and regional programs involved in congestion management. Since 2008, the TPB has released three biennial CMP Technical Reports (2008, 2010, and 2012), and this draft 2014 Report documents the updates of the CMP from mid-2012 to mid-2014.

Reviews Conducted

This draft 2014 CMP Technical Report has been briefed to the Management, Operations and Intelligent Transportation Systems (MOITS) Technical Subcommittee at its May 13 meeting; the Table of Ongoing State, Local, and Jurisdictional Transportation Demand Management (TDM) Strategies was presented to the Commuter Connections Subcommittee at its May 20 meeting. Comments were solicited from both subcommittees and the revised draft Report dated May 30, 2014 has addressed comments received as of May 28, 2014.

Action Required

Members of the TPB Technical Committee are asked to review the Draft 2014 CMP Technical Report and provide comments. The Executive Summary is attached; Committee members are also strongly encouraged to review the full report, which can be found at the TPB Technical Committee website (direct document URL: http://goo.gl/RMpvJ3), for more detailed information.

Please provide comments by Wednesday, June 18, 2014 to COG/TPB staff Erin Morrow via email: emorrow@mwcog.org, fax: (202) 962-3202, or phone (202) 962-3793. A revised Report based on comments to be received will be brought to the TPB Technical Committee for anticipated finalization at the June 27 meeting.

Attachment:
Executive Summary of the Draft 2014 CMP Technical Report

EXECUTIVE SUMMARY

Background

A Congestion Management Process (CMP) is a requirement stipulated in the 2005 Safe Accountable Flexible Efficient Transportation Equity Act - A Legacy for the Users (SAFETEA-LU), its supporting metropolitan planning regulations, and the 2012 Moving Ahead for Progress in the 21st Century Act (MAP-21). These legislations and regulations were a basis for the CMP component that is wholly incorporated in the region's Constrained Long-Range Plan (CLRP) for transportation. The CMP component of the CLRP constitutes the region's official CMP, and serve to satisfy the federal requirement of having a regional CMP.

This CMP Technical Report serves as a background document to the official CLRP/CMP, providing detailed information on data, strategies, and regional programs involved in congestion management. This 2014 CMP Technical Report is an updated version of the previously published CMP Technical Reports (2012, 2010 and 2008, respectively).

Components of the CMP

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

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

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, 2010-2013

Based on the results revealed by the I-95 Corridor Coalition Vehicle Probe Project (VPP)/INRIX traffic monitoring[1], the Washington region experienced decreasing congestion during peak periods from 2010 to 2013. The annual average decrease in congestion intensity was 2.6% in the four years from 2010 to 2013, as measured by Travel Time Index[2] from a traveler's perspective (Figure 1). The annual average reduction in spatial extent of congestion was 21% in the same

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[1] I-95 Corridor Coalition Vehicle Probe Project, http://i95coalition.net/i95/VehicleProbe/tabid/219/Default.aspx
[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.

time period, as measured by Percent of Congested Miles[3] from a system perspective (Figure 2). This trend should be closely monitored to determine whether this is a short-term trend or a long-term change in travel behavior and how this should affect long-range planning.

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

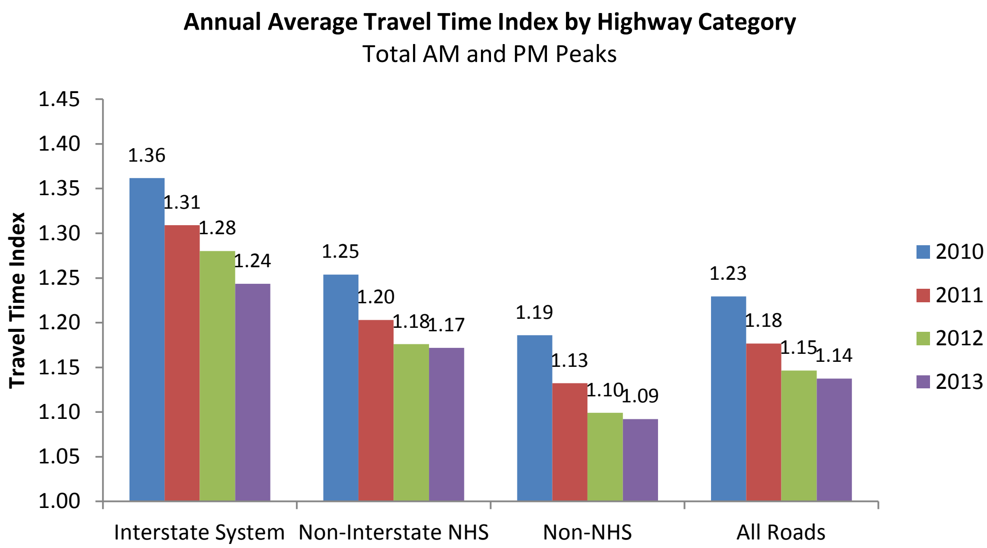
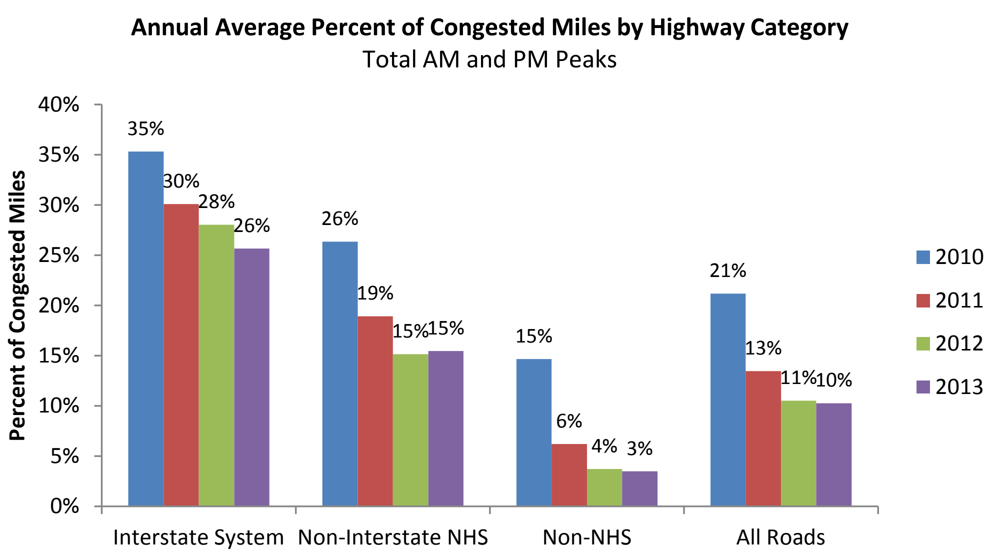


Figure 2: Annual Average Percent of Congested Miles by Highway Category: Total AM and PM Peaks



The pace of decrease had slowed down significantly in 2013. The decrease in Travel Time Index from previous year was 4.3%, 2.6% and 0.8% in 2011, 2012 and 2013, respectively. With regard to the Percent of Congested Miles, the decrease was even more dramatic. The decrease from previous year was 37%, 22% and 3% in 2011, 2012 and 2013.

[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.

While the Interstate System experienced the largest drop (3.0% annually) in congestion intensity from 2010-2013, it had the smallest decrease (10% annually) in the spatial extent of congestion in all the four highway categories (Interstate System, Non-Interstate NHS, Non-NHS, and All Roads) in the same time period. Overall, congestion decreases on the Interstate System were considered “medium”.

The Non-Interstate NHS had the smallest decrease (2.2% annually) in congestion intensity and the second smallest decrease (16% annually) in the spatial extent of congestion from 2010-2013 in all four highway categories. Overall, congestion decreases on the Non-Interstate NHS were considered “small”.

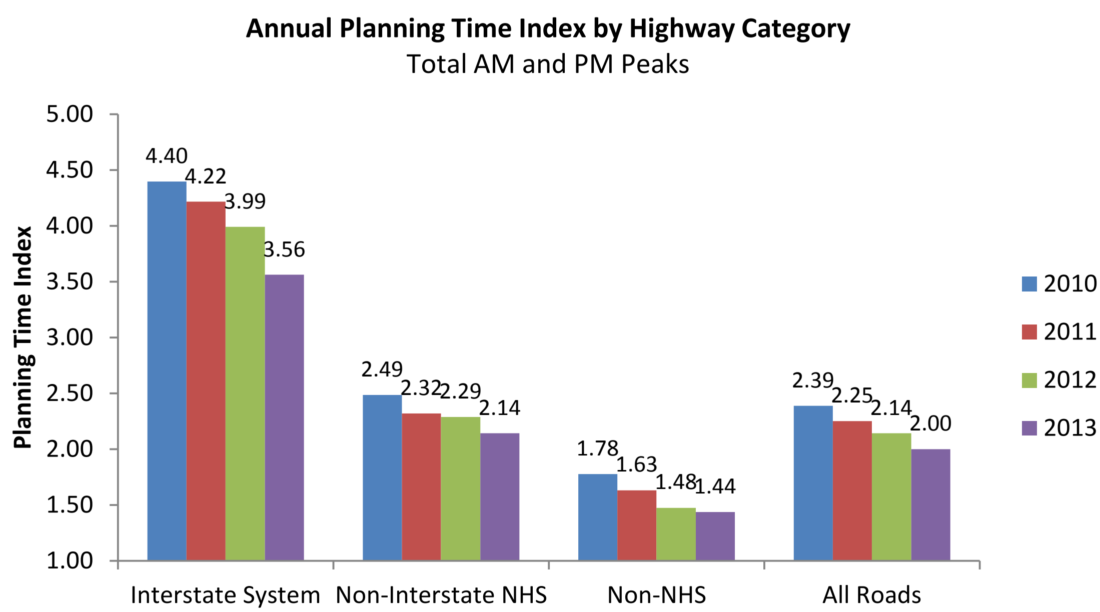
The Non-NHS had the largest decrease (38% annually) in the spatial extent of congestion and the second largest decrease (2.7% annually) in congestion intensity from 2010-2013 in all four highway categories. Overall, congestion decreases on the Non-NHS were considered “large”.

REGIONAL TRAVEL TIME RELIABILITY TRENDS, 2010-2013

Travelers in the Washington region typically will need to budget about two times of 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 even budget more.

Similar to the trends observed in traffic congestion, travel time reliability has improved over time from 2010-2013 (Figure 3). The annual average improvement was 5.7%. Different from traffic congestion, reliability improvement kept a constant pace over the years without clear slowing down in 2013.

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

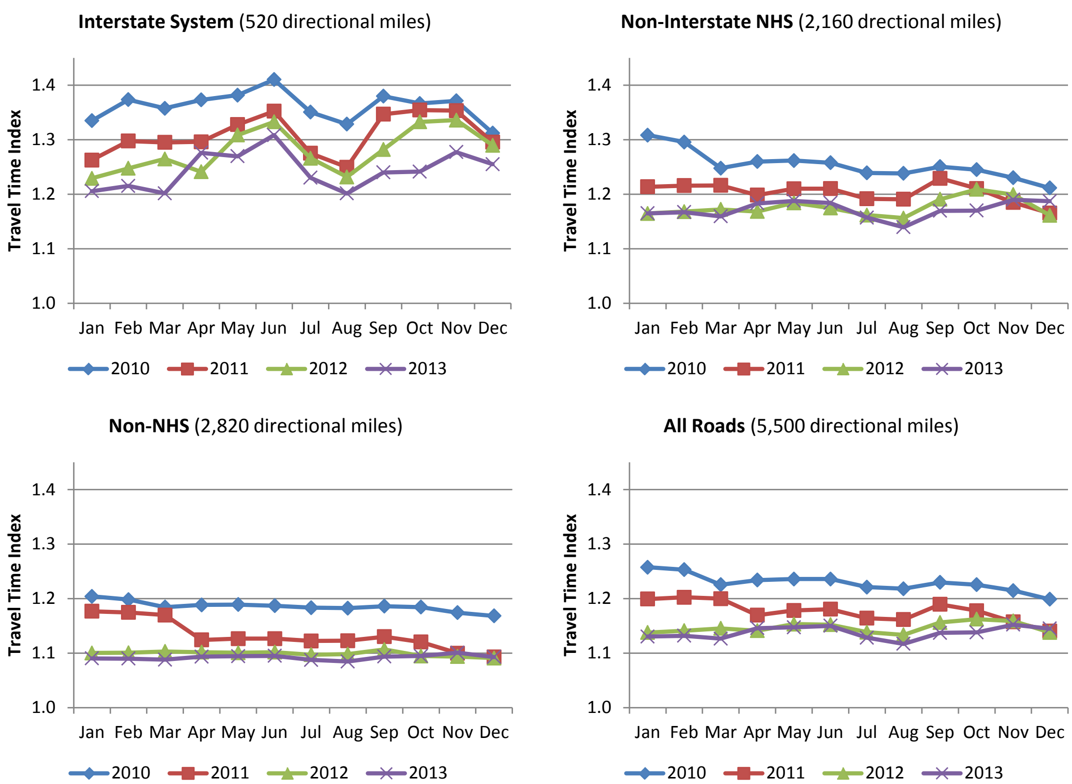


CONGESTION MONTHLY VARIATION

Congestion varies from month to month within a year (Figure 4). Monthly variations of congestion were most noticeable on the Interstate System, followed by the Non-Interstate NHS, and the Non-NHS had the least fluctuations (except in 2011, when a systematic decrease of congestion occurred from the beginning to the end of the year).

Congestion generally had two "lows" and two "highs" within a year on the Interstate System, with one "low-high" pair occurring in the first half of the year and the other in the second half of the year. January was the most frequent "low" month and June was the most likely "high" month on the Interstate System in the first half of the year during both AM and PM peaks. For the second half of the year, August is the "low" month while September, October and November could be the "high" month.

Figure 4: Monthly Variation of Congestion: Total AM and PM Peaks



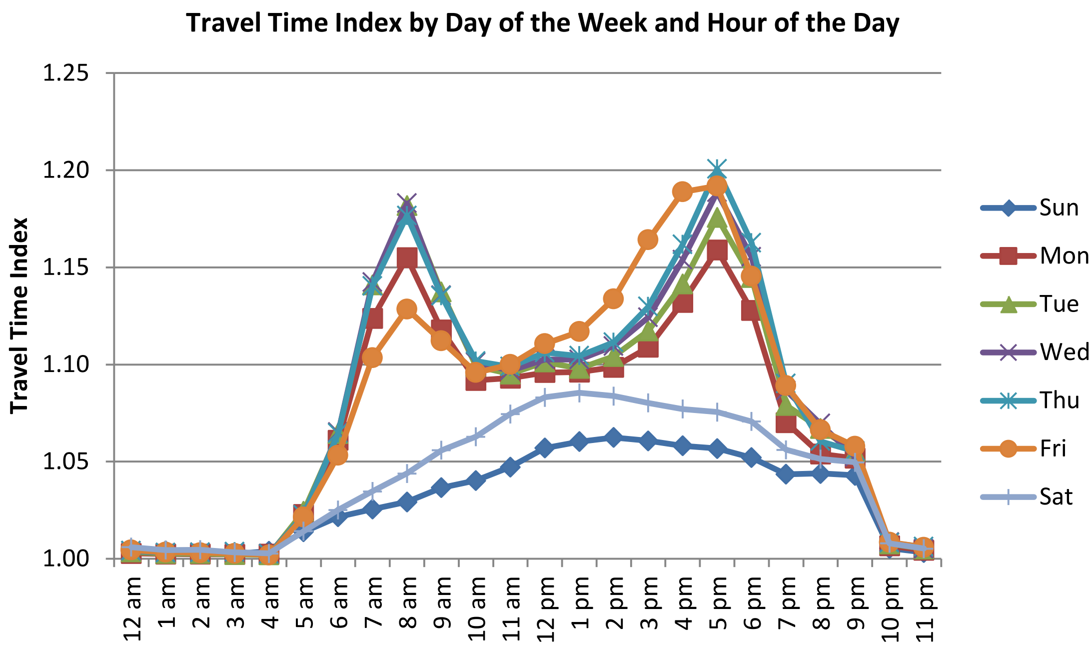
CONGESTION DAY OF WEEK VARIATION

Congestion also varies within a week (Figure 5). The middle weekdays – Tuesday, Wednesday and Thursday – were the most congested days of a week. During these three weekdays, the AM Peak had almost identical congestion while the most congested PM Peak occurred on Thursday, followed by Wednesday and Tuesday.

Monday and Friday had unique traffic patterns. Monday morning's traffic was lower than that of the middle weekdays but higher than Friday; Monday afternoon had the least congestion in all weekdays. Friday morning had the least congestion in all weekdays; Friday afternoon's congestion was almost as bad as the normal weekdays, but it came about one hour earlier without ending earlier – expanded congested time period.

Weekend days had the lowest traffic in a week and Sunday was even lower than Saturday. During these two days, mid-day traffic (12:00 – 3:00 pm) was the highest.

Figure 5: Day of Week Variation of Congestion in 2013



TOP BOTTLENECKS

This report adopts the VPP Suite[4] to identify the top 10 most significant bottlenecks in the TPB Planning Area and bottlenecks outside the Planning Area but having significant impact on the region in 2013. Based on vehicle speed, the VPP Suite identified 10 top bottlenecks in the TPB Planning Area and additional seven bottlenecks adjacent to the Planning Area with their queues extended into the TPB region, as listed in Table 1 and mapped in Figure 6. Table 2 is a new bottleneck ranking based on speed and annual average daily traffic (AADT), which takes into consideration the number of vehicles and travelers affected by the choke points.

Long queues along southbound I-95 in Virginia, northbound I-95 in Maryland and northbound MD-295 were partially due to bottlenecks outside of the TPB Planning Area. These bottlenecks were far more significant, as measured by the Impact Factor[5], than the TPB Planning Area's No. 1 bottleneck in 2013 – the American Legion Bridge Inner Loop on I-495. In particular, bottlenecks in Fredericksburg and Stafford County, Virginia generated queues as long as 30 miles, with tremendous impact on the southbound travel along I-95 in the region. Addressing these bottlenecks involves coordination with jurisdictions outside the TPB Planning Area.

[4] The Vehicle Probe Project (VPP) Suite is a web-based tool kit developed by the CATT Lab of the University of Maryland to draw queries from the archived VPP/INRIX data. https://vpp.ritis.org/suite/

[5] The VPP Suite uses the Impact Factor, the product multiplication of Duration (minutes), Queue Length (miles) and the number of Occurrences, to rank bottlenecks.

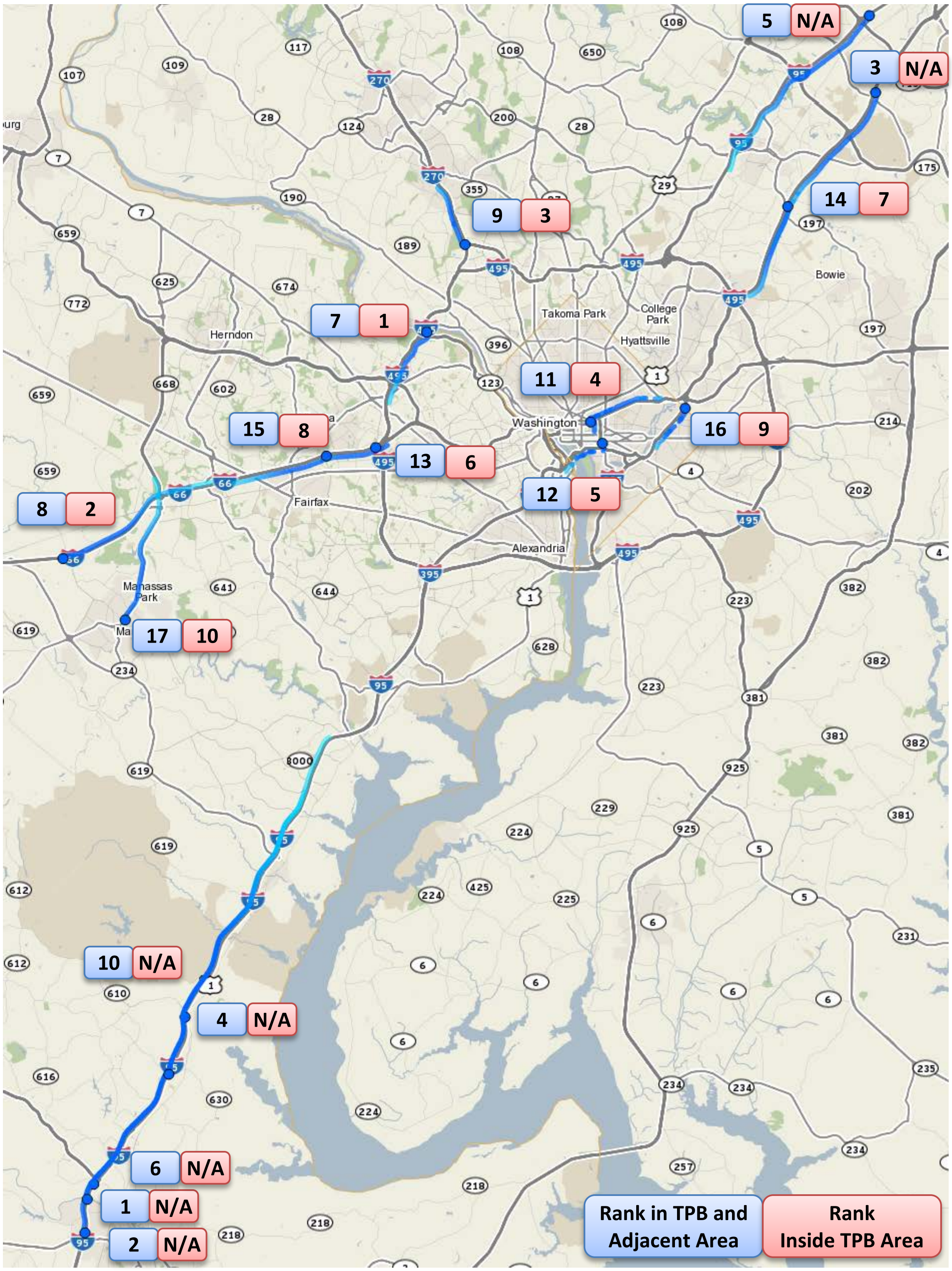
Table 1: 2013 Top Bottlenecks Based on Speed

Rank in TPB and Adjacent Area	Rank Inside TPB Area	Location	Average Duration	Queue Length (miles)	Occurrences	Impact Factor
1	N/A	I-95 S @ Fredericksburg/Stafford Co Line	5 h 6 m	32.0	311	3,055,956
2	N/A	I-95 S @ VA-3/Exit 130	5 h 45 m	32.3	115	1,283,658
3	N/A	MD-295 N @ MD-175	3 h 48 m	13.8	261	823,541
4	N/A	I-95 S @ VA-630/Exit 140	4 h 6 m	20.1	161	795,652
5	N/A	I-95 N @ MD-100/Exit 43	2 h 51 m	14.5	279	756,736
6	N/A	I-95 S @ US-17/Exit 133	5 h 8 m	30.2	60	657,455
7	**1**	**I-495 CW @ American Legion Bridge**	**2 h 47 m**	**4.7**	**800**	**640,474**
8	**2**	**I-66 W @ VA-234/Exit 47**	**2 h 21 m**	**10.9**	**339**	**604,192**
9	**3**	**I-270 Spur S @ I-270**	**1 h 42 m**	**6.4**	**884**	**591,198**
10	N/A	I-95 S @ US-1/VA-610/Exit 143	3 h 9 m	12.0	175	558,193
11	**4**	**US-50 W @ 10th St**	**4 h 19 m**	**13.1**	**145**	**546,624**
12	**5**	**I-395 N @ 2nd St**	**1 h 43 m**	**3.8**	**1388**	**534,048**
13	**6**	**I-66 E @ I-495/Exit 64**	**1 h 53 m**	**4.6**	**968**	**513,693**
14	**7**	**MD-295 N @ MD-197/Exit 11**	**2 h 47 m**	**6.7**	**444**	**505,186**
15	**8**	**I-66 E @ Vaden Dr/Exit 62**	**1 h 58 m**	**6.5**	**567**	**490,498**
16	**9**	**DC-295 N @ Eastern Ave**	**2 h 49 m**	**3.9**	**428**	**334,024**
17	**10**	**VA-28 S @ Prescott Ave/Sudley Rd**	**3 h 23 m**	**8.2**	**196**	**330,540**

Table 2: 2013 Top Bottlenecks Based on Speed and AADT

Rank in TPB and Adjacent Area	Rank Inside TPB Area	Location	Average Duration	Queue Length (miles)	Occurrences	Impact Factor	2011 AADT*
1	N/A	I-95 SB @ Fred./Sta. Co Line	5 h 6 m	32.0	311	3,055,956	70,500
2	**1**	**I-270 Spur SB @ I-270**	**1 h 42 m**	**6.4**	**884**	**591,198**	133,326
3	N/A	I-95 NB @ MD-100/Exit 43	2 h 51 m	14.5	279	756,736	97,667
4	N/A	I-95 SB @ VA-3/Exit 130	5 h 45 m	32.3	115	1,283,658	56,500
5	**2**	**I-495 CW @ American Legion Bridge**	**2 h 47 m**	**4.7**	**800**	**640,474**	107,242
6	N/A	I-95 SB @ VA-630/Exit 140	4 h 6 m	20.1	161	795,652	67,000
7	**3**	**I-66 EB @ Vaden Dr/Exit 62**	**1 h 58 m**	**6.5**	**567**	**490,498**	89,000
8	N/A	I-95 SB @ US-17/Exit 133	5 h 8 m	30.2	60	657,455	65,500
9	**4**	**I-66 EB @ I-495/Exit 64**	**1 h 53 m**	**4.6**	**968**	**513,693**	81,000
10	**5**	**I-395 NB @ 2nd St**	**1 h 43 m**	**3.8**	**1388**	**534,048**	75,716
11	N/A	MD-295 NB @ MD-175	3 h 48 m	13.8	261	823,541	48,225
12	N/A	I-95 SB @ US-1/VA-610/Exit 143	3 h 9 m	12.0	175	558,193	70,500
13	**6**	**I-66 WB @ VA-234/Exit 47**	**2 h 21 m**	**10.9**	**339**	**604,192**	63,500
14	**7**	**MD-295 NB @ MD-197/Exit 11**	**2 h 47 m**	**6.7**	**444**	**505,186**	53,535
15	**8**	**DC-295 NB @ Eastern Ave**	**2 h 49 m**	**3.9**	**428**	**334,024**	56,374
16	**9**	**US-50 WB @ 10th St**	**4 h 19 m**	**13.1**	**145**	**546,624**	12,146
17	**10**	**VA-28 SB @ Prescott Ave/Sudley Rd**	**3 h 23 m**	**8.2**	**196**	**330,540**	14,464

Figure 6: 2013 Top Bottlenecks Based on Speed



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 2010-2013, as described in Chapter 2 and Appendix C.

CONGESTION ON ARTERIALS

The TPB's arterial monitoring program had been carried out by staff using global positioning system (GPS)-equipped floating vehicles. The last regional survey was conducted in FY[6] 2011, which was summarized in the 2012 CMP Technical Report. In view of emerging data sources such as the VPP/INRIX data, NPMRDS[7] and Bluetooth data, staff has started applying such data in arterial traffic monitoring.

Travel Time Index and Planning Time Index on Non-Interstate NHS are provided in great detail in Appendices A and B. In the near future, staff plans to use the VPP/INRIX data to carry out arterial corridor travel time studies on the routes monitored by the floating car surveys and other routes considered important.

TRAFFIC SIGNAL TIMING

Delays occurred at signalized intersections accounted for a significant portion of overall arterial and urban street delays. Improving traffic signal timing has been identified as a CLRP priority area.

The TPB has conducted three surveys of the status of signal optimization in 2005, 2009 and 2013. The 2013 survey found that between 2009 and 2012, the total 5,400 signalized intersections in the region, 80 percent were computer optimized (56%) or checked or adjusted (24%).

The TPB has conducted three surveys of the status of signal optimization in 2005[8], 2009[9], and 2013[10]. The 2013 survey found that of the total 5,500 signalized intersections in the region, 76 percent were retimed/optimized, 22 percent not retimed/optimized, and no report received for 2 percent. This was a similar but slightly reduced level of optimization compared to the last such survey in 2009, in which 80 percent signals were retimed/optimized.

Since late 2011, the Traffic Signal Subcommittee has conducted five regional surveys on traffic signals power back-up systems[11]. The last survey was conducted by June 30, 2013 and found

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[6] A TPB Fiscal Year (FY) starts on July 1 and ends on June 30 of the next year, e.g., FY 2010 is from 7/1/2009 – 6/30/2010.

[7] National Performance Management Research Data Set (NPMRDS), a national data set procured by FHWA from HERE, LLC. http://www.ops.fhwa.dot.gov/freight/freight_analysis/perform_meas/vpds/npmrdsfaqs.htm

[8] COG/TPB, http://www.mwcog.org/uploads/committee-documents/tVtXWlY20051110144208.pdf

[9] COG/TPB, http://www.mwcog.org/uploads/committee-documents/bV5cXFhc20090312161527.pdf

[10] COG/TPB, http://www.mwcog.org/uploads/committee-documents/al1ZXFpb20140212133426.pdf

[11] COG/TPB, http://www.mwcog.org/uploads/committee-documents/ZF1ZXVhW20140204080431.pdf

that about 26% of the region's 5,500+ signals are already equipped with battery-based power back-up systems, and 61% are equipped with generator-ready back-up systems (most battery-based systems also have generator-ready features). These back-up systems are critical in the event of an emergency, particularly if the event involves a lack of power.

Congestion on Transit and Other Systems

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 transit systems, such as rail and bus. The identified congested locations, especially those on the Washington Metropolitan Area Transit Authority's (WMATA) Priority Corridor Network, are usually also bottlenecks for bus transit. Relieving roadway congestion will directly have a positive impact on 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, such as the maximum load stations recorded in the WMATA's Vital Sign Reports[12], e.g., Orange Line Court House station and Red Line Gallery Place station. 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. The 2008 Metrorail Station Access & Capacity Study found that 19 Metrorail stations need to expand their capacity in order to satisfy the demand imposed by existing large ridership and/or future ridership increases.

CORDON COUNTS

The cordon count program originated from the desire to assess the impact of the construction of the region's Metrorail system stating in the late 1960's. Thus, a cordon line around the Central Business District (the "core") was determined by the inbound point at which there were more destinations (alighting from transit buses) than origins (loadings onto transit buses). The most recent cordon count study is the 2013 Central Employment Core Cordon Count of Vehicular and Passenger Volumes[13]. Data were only collected from 5:00 A.M. to 10:00 A.M. The study found:

- Total inbound travel decreased in the A.M. peak period from about 463,000 person trips in 2009 to 446,000 in 2013. Trips crossing the revised cordon in 2013 were about 435,000.

[12] WMATA, Scorecard, https://wmata.com/about_metro/scorecard/index.cfm
[13] *2013 Central Employment Core Cordon Count of Vehicular and Passenger Volumes*, Draft, December 30, 2013. http://www.mwcog.org/uploads/committee-documents/k11ZXV5e20140127094130.pdf

- Inbound peak period transit trips were about 211,000, little changed from 2009. Transit trips crossing the revised cordon line were about 197,000.

- Person trips by automobile in 2013 were about 236,000, a decrease of about 21,000 from 2009. Most of the decrease in person trips were in multiple occupant vehicles (2 or more persons per vehicles), which declined by about 21,000 trips.

- The number of automobiles entering the Central Employment Core in the A.M. peak period has declined from 203,000 in 2009 to about 192,500 in 2013. For the five-hour monitoring period, the decline was similar in absolute terms, from about 273,000 in 2009 to 263,000 in 2013.

- Traffic volumes crossing the revised cordon line were only slightly higher, but person trips were lower.

- About 3,500 bicycles entered the Central Employment Core in the A.M. peak period. In the full five hour monitoring period, almost 5,000 trips by bike were observed.

HOV FACILITIES

COG/TPB has conducted surveys on the high occupancy vehicle (HOV) freeway facilities in 1997, 1998, 1999, 2004, 2007 and 2010. The most recent survey found that: 1) during Spring 2010, all of the HOV lanes required fewer cars to carry more persons per lane during the HOV restricted periods than adjacent non-HOV lanes making the HOV lanes more efficient at moving people to their destinations; 2) most of the HOV lanes provide travel time savings when compared to non-HOV alternatives, especially the barrier separated HOV lanes in the I-95/I-395 corridor in Northern Virginia; and 3) average auto occupancy in 2010 was little-changed from 2004 and 2007, even though the HOV lanes in Northern Virginia continue to exempt vehicles with “Clean Special Fuel Vehicle” registration plates from the HOV requirement.

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 Park & Ride 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.

The 2008 Metrorail Station Access & Capacity Study found Metro presently owns and operates 58,186 parking spaces. On an average weekday, almost all of those spaces are occupied, especially stations at East Falls Church, Van Dorn Street, Naylor Road and Branch Ave. Only a handful of stations—White Flint, Wheaton, College Park-U of MD, Prince George’s Plaza, and Minnesota Ave—have a substantial amount of daily unused available capacity.

In 2009, WMATA and VDOT completed the Feasibility Study of Real Time Parking Information at Metrorail Parking Facilities (Virginia Stations)[14], evaluating the feasibility of a real-time parking application for the Metrorail system, with the purpose of improving operations efficiency, reducing operating costs by providing guidance to available parking spaces, encouraging more transit usage and reducing congestion

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[15], the majority (92%) 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.

The TPB regularly carries out Regional Airport Ground Access Travel Time Studies (1995, 2003 and 2011) and provides relevant information to congestion management. Comparing the 2011ground access travel time data to that of 2003, it was found travel time overall was increasing.

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 three quarters of freight traveling to, from, or within the region is transported by truck[16]. The interaction between freight movement and passenger travel is high. The following five worst truck bottlenecks[17] are also among the most congested locations for all traffic.

- I- 95 at VA-7100, Virginia
- I- 95 at VA-234, Virginia
- I-95 at I- 495, Maryland
- I- 495 at American Legion Bridge, Virginia
- I-495 at I-66, Virginia

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[14] Wilbur Smith Associates and Michael Baker Jr., Inc., Feasibility Study of Real Time Parking Information at Metrorail Parking Facilities (Virginia Stations), June 2009. http://www.wmata.com/pdfs/planning/Real_Time_Parking_Study.pdf

[15] *2013 Washington-Baltimore Regional Air Passenger Survey Data Editing Process*, 2014-01-23 Aviation Technical Subcommittee: http://www.mwcog.org/uploads/committee-documents/b11ZXVpf20140131093313.pdf

[16] . *Enhancing Consideration of Freight in Regional Transportation Planning,* Cambridge Systematics, Inc., 2007. http://www.mwcog.org/uploads/committee-documents/bF5fW1pX20080222142629.pdf

[17] I-95 Corridor Coalition, *Mid-Atlantic Truck Operations study – Final Report*. Cambridge Systematics, Inc. October 2009. http://www.i95coalition.net/i95/Portals/0/Public_Files/pm/reports/DFR1_MATOps_Truck%20Operations%20V3.pdf

Future Congestion

The 2013 CLRP Performance Analysis[18] forecasts the outlook for growth in the region. One of the cornerstones of plan performance is the forecasting of future congestion. The plan performance looks at where in the region congestion will occur in the future and compares current congestion to future congestion. It looks at criteria that may affect congestion, such as changes in population, employment, transit work trips, vehicle work trips, lane miles, and lane miles of congestion. The analysis also breaks down lane miles of congestion into core, inner suburbs, and outer suburbs, providing information on where, generally, the most lane miles of congestion can be found in 2040 compared to 2014.

From 2014 to 2040, the region-wide total number of trips taken is expected to increase by 24%. The overall amount of driving in the region (VMT) is expected to grow by 23%, slightly less than population, which means VMT per capita is forecast to drop by 1%. The increase in demand on the roadways (+24% more trips) is forecast to outpace the increase in supply (+7% lane miles), leading to a significant increase in congestion (+71% lane miles of congestion).

Severe stop-and-go congestion during the AM peak is expected to be prevalent throughout the entire region in 2040. Outer suburban jurisdictions are forecast to experience the greatest increase in congestion, while the already congested inner suburbs will experience the worst overall congestion.

Outer suburban jurisdictions in the region will experience the greatest increase in congestion, while the already congested inner suburban jurisdictions will experience the worst overall congestion. Making matters worse, congestion will increasingly not be limited to rush-hour periods, but will also affect off-peak weekday periods and weekends.

Due to a lack of funding for capacity enhancement projects to accommodate all of the projected transit ridership growth in the region, the Metrorail system will likely reach capacity on trips to and through the regional core. According to a WMATA study, without additional railcars beyond those currently funded, all lines entering the core will become congested by 2040, and the Orange/Dulles, Yellow and Green lines are forecast to be highly congested.

Another way to measure the performance of the plan is by residents' accessibility to jobs by transit and auto. The average number of jobs accessible within a 45 minute automobile commute is expected to go down slightly from 919,000 in 2014 to 893,000 in 2040. Average accessibility by transit is forecast to increase from 412,000 in 2014 to 516,000 in 2040, but will remain significantly lower than by automobile.

National Comparison of the Washington Region's Congestion

The Washington region is among the several most congested metropolitan areas in the nation. Based on the ratio of actual travel time over free flow travel time (or Travel Time Index), the region ranked 4th in Texas Transportation Institute's 2012 Urban Mobility Report (for 2011 data), and 10th in INRIX's National Traffic Scorecard (for 2013 data). Different methodologies

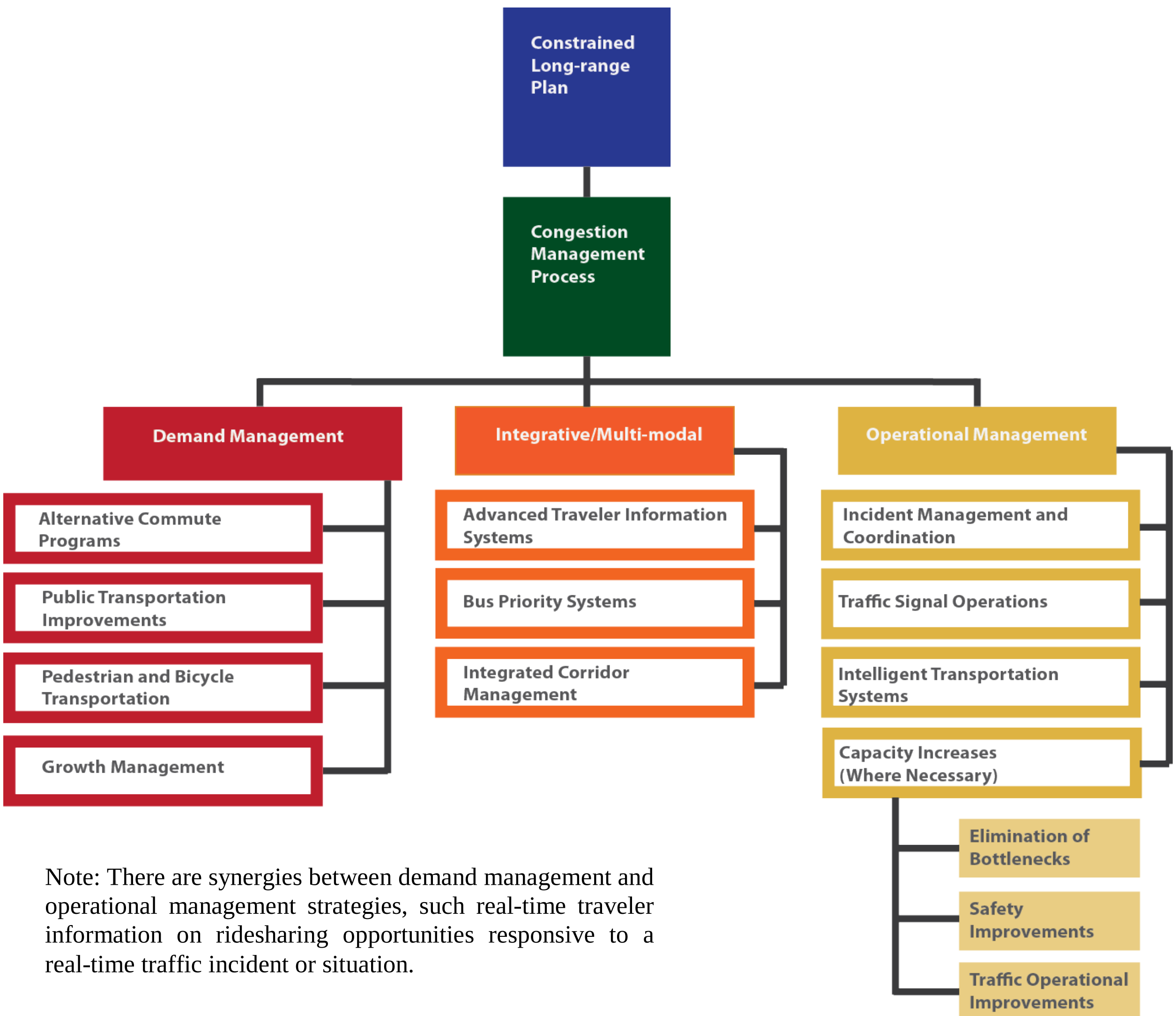
[18] 2013 Performance Analysis of the CLRP, Presentation to the TPB, 2013-12-18: http://www.mwcog.org/uploads/committee-documents/YV1aVlhZ20131218092900.pdf

are the most likely reason for this discrepancy in ranking, such as the different spatial and temporal coverage of the data, and the different weight used to calculate the regional value. Based on annual hours of delay per traveler, this region ranked 1st in 2011 (67 hours) in the Urban Mobility Report.

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. The CLRP 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 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.

Figure 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.

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:

- Commuter Connections Program – Including strategies such as Telework, Employer Outreach, Guaranteed Ride Home, Liver 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 can be found in Washington, D.C., Arlington County, the City of Alexandria, and Montgomery County, MD. There are plans and/or studies to expand the network to locations in Prince George's County and Fairfax County
- Car sharing - Local governments work with private companies (e.g., Zipcar, Car2Go, and Hertz 24/7, and Enterprise) 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:

- High Occupancy Vehicle (HOV) facilities – Existing HOV facilities include I-66, I-95/I-395, I-270, US-50 and the Dulles Toll Road.
- Variably-Priced Lane Facilities – The 18-mile Inter-county Connector (ICC) in Maryland opened from I-270 to I-95 in November 2011; the 495 Express Lanes in Northern Virginia opened in November 2012; and the 95 Express Lane project in Northern Virginia is under construction with an expected a completion date of 2015.
- 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 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 Management, Operations, and Intelligent Transportation Systems (MOITS) program and committees. Examples include traffic signal optimization, safety service patrols, and traveler information.

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 - VDOT's current ICM project development focuses on I-95 and US-1 corridor from the DC line to Fredericksburg. VDOT launched the first ICM initiative on the corridor in February 2014.
- 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 with travelers.
- Bus Priority Systems - There have been three pilot deployments in the region: U.S. 1 (Fairfax County), Columbia Pike (Arlington County), and Georgia Avenue (DC). These are pilot projects intended to provide lessons learned for wider deployments.

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 Management, Operations and Intelligent Transportation Systems (MOITS) program.

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.
- In conjunction with the regional air quality process, vehicle trips reduced, vehicle miles of travel (VMT) reduced and environmental benefits are assessed in the Transportation Emission Reduction Measure (TERM) Evaluations.

- Public transportation improvements, pedestrian and bicycle transportation improvements, and land use strategies are assessed in Regional Household Travel Surveys, Regional Bus Surveys, Regional Activity Centers and Regional Activity Clusters Studies, the Regional Travel Trends Report, and Cordon Counts.
- The region's HOV facilities are monitored by the TPB's HOV monitoring and surveys.
- Status of traffic signal timing is assessed by Management, Operations and Intelligent Transportation Systems (MOITS) program's traffic signal timing surveys. Traffic signal power backup system was surveyed by the Traffic Signal Subcommittee of the MOITS program.
- The Metropolitan Area Transportation Operations Coordination (MATOC) program is assessed by a benefit-cost study.

Overall assessments (of all implemented strategies):

- The TPB's aerial photography survey of the region's freeway system congestion conditions (every three years for AM and PM peak periods and every five years for weekend and off-peak period).
- The TPB's arterial floating car travel time and speed study (every year a sample of major arterials in DC, MD and VA is studied and the same sample was repeated every three years). This study was terminated in FY 2012 and an enhanced arterial monitoring program is under development. COG/TPB has procured a comprehensive historical dataset for calendar year 2010 from INRIX, Inc. to benchmark regional arterial performance.
- In addition to the TPB's monitoring activities, the TPB also utilize other regional and national monitoring activities to complement and enhance the congestion monitoring and analysis in the National Capital Region. These utilized "outside" monitoring activities include:
    a) I-95 Corridor Coalition/INRIX, Inc. probe-vehicle-based traffic monitoring data.
    b) The FHWA Transportation Technology Innovation and Demonstration (TTID) Program/ Traffic.com traffic monitoring.
    c) Maryland, Virginia and the District of Columbia's Highway Performance Monitoring Systems (HPMS).

Assessment of Potential Strategies Through Scenario Planning

The TPB has a long history of strategy analysis for air quality purposes which focuses on emissions reductions from individual strategies. The two most recent scenario studies, the CLRP Aspirations Scenario and the "What Would it Take?" Scenario looked at groupings of strategies and how they could interact with each other.

The CLRP Aspirations Scenario is an integrated future land use and transportation scenario for building on the key results of previous TPB scenario studies. It includes concentrated land use growth in Regional Activity Centers, a regional network of variably priced lanes, and a high quality bus rapid transit network operating on the VPL network for the current planning horizon year 2040. The most recent version of the CLRP Aspirations Scenario was presented to the TPB in October 2013.

In May 2010, the TPB completed a scenario study examining the role of regional transportation in climate change mitigation in the Washington region, called the "What Would it Take?" scenario. The scenario is a goal-oriented study that specifically asks and tries to answer the question of what it would take in the Washington region to meet aggressive greenhouse gas emissions reduction goals in transportation. The study includes the analysis of over 50 strategies from national level CAFE standards and alternative fuel mandates to regional and local level bicycle plans and congestion reduction strategies to determine their potential to reduce emissions and contribute to the environmental resilience of this region.

In an effort to assist municipalities in implementing strategies suggested by the Scenario Study, the TPB created 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. Through the program, the TPB provides communities with up to $60,000 worth of technical assistance to catalyze or enhance planning efforts. Any local jurisdiction that is a member of the TPB is eligible to apply. The second part of the TLC program is the Clearinghouse, a web-based source of information about transportation/land use coordination, including regional and national experience with transit-oriented development and other key strategies.
Some potential operational congestion management strategies are assessed in the Strategic Plan for the Management, Operations and Intelligent Transportation Systems (MOITS) Planning Program[19].

TPB also assesses special potential strategies on an as-needed basis, such as congestion pricing.

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 Call for Projects documentation forms, which are submitted from regional agencies when the CLRP 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.

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[19] *Strategic Plan for the Management, Operations and Intelligent Transportation Systems (MOITS) Planning Program*, June 16, 2010. http://www.mwcog.org/transportation/activities/operations/moits-strategic.asp

Congestion Management as a Process in the CLRP

Components of the CMP Fully Integrated in the CLRP

The four major components of the CMP as described earlier are fully integrated in the CLRP. More specifically:

In monitoring and evaluating transportation system performance, the TPB uses Skycomp aerial photography freeway monitoring and a number of other travel monitoring activities to support both the CMP and travel demand forecast model calibration, complementing operating agencies' own information, and illustrating locations of existing congestion. CLRP travel demand modeling forecasts, in turn, provide information on future congestion locations. This provides an overall picture of current and future congestion in the region, and helps set the stage for agencies to consider and implement CMP strategies, including those integrated into capacity-increasing roadway projects.

The CMP component of the CLRP defines and analyzes a wide range of potential demand management and operations management strategies for consideration. TPB, through its Technical Committee, Travel Management Subcommittee, Travel Forecasting Subcommittee, and other committees, reviews and considers both the locations of congestion and the potential strategies when developing the CLRP.

For planned (CLRP) or programmed (TIP) projects, cross-referencing the locations of planned or programmed improvements with the locations of congestion helps guide decision makers to prioritize areas for current and future projects and associated CMP strategies. Maps in the 2009 CLRP showed a high correlation between the locations of planned or programmed projects and locations where congestion is being experienced or is expected to occur.

Thus CLRP and TIP project selection is informed by the CMP, and implementation of CMP strategies is encouraged. The region relies particularly on non-capital congestion strategies in the Commuter Connections program of demand management activities, and the Management, Operations, and Intelligent Transportation Systems (MOITS) program of operations management strategies. Assessments of these programs are analyzed, along with regular updates of travel monitoring to look at trends and impacts, to feed back to future CLRP cycles.

The TPB also compiles information pertinent to specific projects in its CMP documentation process (form) within the annual CLRP Call for Projects. This further assures and documents that the planning of federally-funded SOV projects has included considerations of CMP strategy alternatives and integrated components.

Regional Transportation Priorities Plan Facilitates CMP-CLRP Integration

The Regional Transportation Priorities Plan (RTPP) , which is a milestone of TPB's Performance-Based Planning approach, facilitates the integration of the CMP and the CLRP. The RTPP was approved by the TPB in January 2014.

Building on the TPB Vision and previous regional transportation planning activities, the RTPP identifies those transportation strategies that offer the greatest potential contributions to addressing continuing regional challenges, and to provide support for efforts to incorporate those strategies into future updates of the CLRP in the form of specific programs and projects. The plan articulates regional priorities for enhancing the performance of the CLRP by advancing six regional goals:

1) Provide a Comprehensive Range of Transportation Options
2) Promote a Strong Regional Economy, Including a Healthy Regional Core and Dynamic Activity Centers
3) Ensure Adequate System Maintenance, Preservation, and Safety
4) Maximize Operational Effectiveness and Safety of the Transportation System
5) Enhance Environmental Quality, and Protect Natural and Cultural Resources
6) Support Inter-Regional and International Travel and Commerce

The RTPP is a policy document to help guide implementing agencies (local, state and regional) in the project development process to consider regional needs when identifying transportation improvements for inclusion in the CLRP. The CMP can help inform that process.

Key Findings of the 2014 CMP Technical Report

1. The Washington region experienced decreasing congestion during peak periods from 2010-2013, but the pace of decrease had slowed down significantly in 2013. The decrease in Travel Time Index from previous year was 4.3%, 2.6% and 0.8% in 2011, 2012 and 2013, respectively; the annual average decrease was 2.6%. With regard to the Percent of Congested Miles, the decrease was even more dramatic. The decrease from previous year was 37%, 22% and 3% in 2011, 2012 and 2013, respectively (Section 2.1.1.1).

2. The Washington region experienced steady improvement in travel time reliability during peak periods from 2010-2013. The improvement in travel time reliability, measured by Planning Time Index, from previous year was 6%, 5% and 7% in 2011, 2012 and 2013, respectively; the annual average improvement was 6% (Section 2.1.1.2).

3. Long queues along southbound I-95 in Virginia, northbound I-95 in Maryland and northbound MD-295 were partially due to bottlenecks outside of the TPB Planning Area. In particular, bottlenecks in Fredericksburg and Stafford County, Virginia generated queues as long as 30 miles, with tremendous impact on the southbound travel along I-95 in the region. Addressing these bottlenecks involves coordination with jurisdictions outside the TPB Planning Area (Section 2.1.1.5).

4. 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. This region has enhanced efforts in regional transportation operations coordination. The Metropolitan Area Transportation Operations Coordination (MATOC) program was recently enhanced with more staff covering longer time period, and a dedicated MATOC

public website (www.matoc.org) providing real-time traffic and incidents information (Section 3.3.3.4).

6. Congestion management strategies of Management, Operations, and Intelligent Transportation Systems (MOITS) provide essential ways to make most of the existing transportation facilities (Section 3.3.3).

7. Variably Priced Lanes (VPLs) provide options to travelers. Maryland Route 200 (Inter-county Connector (ICC)) was fully opened in November 2011 for the section between I-270 and I-95; a Before-and-After study identified the ICC improved its adjacent area's traffic by 3-4%. The 495 Express Lanes opened on the Virginia side of the Capital Beltway in November 2012 and in the fourth quarter of 2013, there were almost 38,000 average weekday trips and the lines reached a milestone of over one million unique customers. The 95 Express Lanes in Northern Virginia are expected to open in 2015 (Section 3.3.2).

8. Bikesharing and carsharing programs continue to grow providing transportation options to urban residents to wish to remain car-free or car-lite (Sections 3.2.4 and 3.2.5).

9. Mobile devices and social media are changing the way travelers make decisions. 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).

10. The TPB's Regional Transportation Priorities Plan (RTPP) takes a performance-based transportation planning approach to identify those transportation strategies that offer the greatest potential contributions to addressing continuing regional challenges, and to provide support for efforts to incorporate those strategies into future updates of the CLRP in the form of specific programs and projects. The MAP-21 legislation strengthens the performance-based approach to planning. The CMP supports the RTPP by monitoring congestion and providing strategies that could improve the mobility of the transportation systems (Section 5.5).

Recommendations for the Congestion Management Process

The 2014 CMP Technical Report documents the updates of the Congestion Management Process in the Washington region from mid-2012 to mid-2014. Looking forward, the report leads to several important recommendations for future improvements.

1. **Refine the Congestion Management Process to help meet the requirements stipulated by MAP-21 and its subsequent federal regulations.** It is anticipated that traffic congestion, system performance of the Interstate System and non-Interstate NHS, and freight movement on the Interstate System will be analyzed and reported by FHWA standards specified in forthcoming rulemakings. The CMP will also improve to help

support performance-based planning and programming processes as mandated by the MAP-21.

2. **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 reduces transportation emissions and improves air quality, as identified by the TERMs evaluations.

3. **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 the construction and coordination. Future enhancements of the MATOC program should be considered when appropriate to expand the function and participation of the program.

4. **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.

5. **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.

6. **Consider variable pricing and other management strategies in conjunction with capacity increasing projects.** Variably priced lanes (VPLs) provide a new 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. **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.

9. **Pursue increased 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 a congested corridor to explore the feasibility of an ICM system. Ongoing projects on I-95/I-395 and I-66 support these concepts.

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. Websites such as MATOC's www.trafficview.org, www.CapitalRegionUpdates.gov, state DOTs' 511 systems, and real-time transit information allow travelers to make more informed decisions for their trips. The value of real-time traveler information can be largely enriched by integrating historical travel information which can provide valuable travel time reliability measures.

11. **Continue to look for ways to safely interface with the public through new technology such as mobile devices and social media.** The increased prevalence of mobile internet-capable devices and social media present a rapidly evolving platform for both disseminating and gathering information.

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. **Continue to monitor recent trends in congestion**. Recent data show flat or decreasing congestion, in contrast to many years historically of increasing congestion. This trend should be closely monitored to determine whether this is a short-term trend or a long-term change in travel behavior and how this should affect long-range planning.

15. **Monitor trends in freight, specifically truck travel, as the opening of the Panama Canal expansion nears.** This expansion will allow much larger ships from Asia to serve East Coast ports, including the nearby ones in Baltimore and the Hampton Roads area in Virginia. Much of the new cargo arriving at these ports will pass through the Washington region by truck or rail on its way to inland destinations.