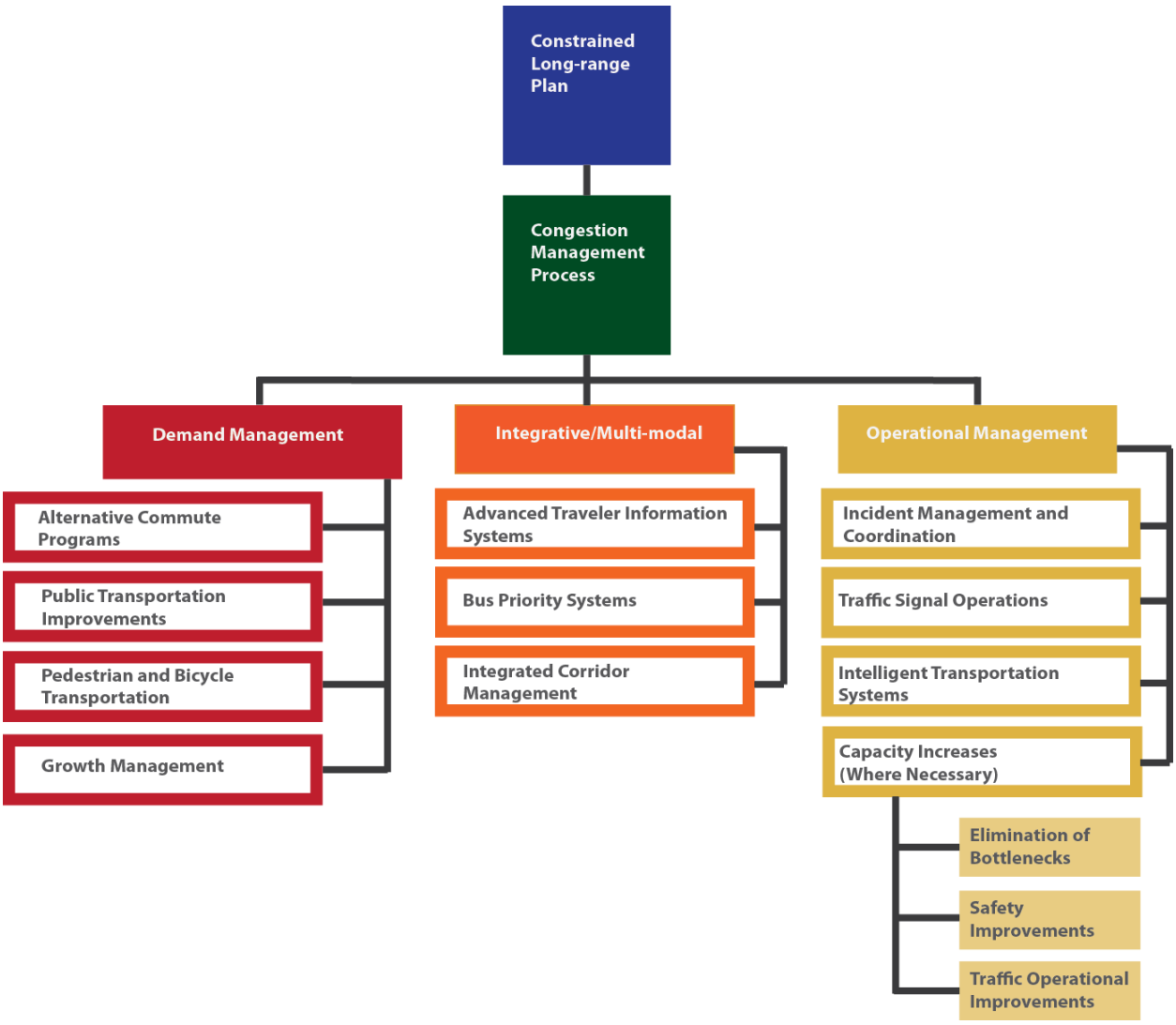
3. CONSIDERATION AND IMPLEMENTATION OF CONGESTION MANAGEMENT STRATEGIES

3.1 Overview of Congestion Management Strategies

Congestion Management Strategies generally can be divided into two types – Demand Management strategies and Operational, or Supply Management strategies. For purposes of this report, a third category, Integrative/Multi-modal, was added to better reflect the integration of demand and operation management in different projects in the region. Figure 3-1 shows examples of congestion management strategies.

Figure 3-1: Major CMP Strategies



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

Demand Management is aimed at reducing the demand for travel and influencing travelers behavior; either overall or by targeted modes. Demand Management strategies can include carpooling, vanpooling, telework programs that allow people to work from home to reduce the amount of cars on the road, and living near your work as a means of reducing commute travel.

Supply or operational management, on the other hand, is managing and making better use of existing transportation network in order to meet the region's transportation goals and ultimately reduce congestion. Example supply management strategies are High-Occupancy Vehicle (HOV) lanes, variably priced lanes, and traffic management.

Often strategies categorized as either demand management or operational management have components of the other. There are strategies in place the region that take that combination a step further and integrate demand and operational management strategies into larger projects. In this report, these strategies have been categorized in this report as Integrative/Multi-modal strategies. Examples of these strategies include advanced traveler information systems and integrated corridor management.

These strategies, and how they are implemented throughout the Washington region, are explained in further detail below.

3.2 Demand Management Strategies

3.2.1 Commuter Connections Program

Commuter Connections is a regional network, coordinated by COG/TPB, which provides commuter information and commuting assistance services to those living and working in the Washington, DC region. This program has been in existence since the 1970's under different names and has implemented a number of demand management strategies in the region. The Commuter Connections program is designed to inform commuters of the availability and benefits of alternatives to driving alone, and to assist them in finding alternatives to fit their commuting needs. The program is funded by the District of Columbia, Maryland, and Virginia Departments of Transportation, as well as the U.S. Department of Transportation, and all services are provided free to the public and employers. Continuing the Commuter Connections Program is one of the key recommendations of the 2018 CMP Technical Report.

Commuter Connections evaluates the impacts of their programs through the Commuter Connections Transportation Demand Management Evaluation Project. The evaluation process allows for both on-going estimation of program effectiveness and for annual and triennial evaluations. The most recent Transportation Emission Reduction Measure (TERM) Analysis Report covered FY2015-2017. [1]

Both qualitative and quantitative types of performance measures are included in the evaluation process to assess effectiveness. First, measures reflecting commuters' and users' awareness, participation, utilization, and satisfaction with the program, and their attitudes related to

[1] *Transportation Emission Reduction Measure (TERM) Analysis Report FY 2015-2017*, November 21, 2017. https://www.commuterconnections.org/wp-content/uploads/2017-TERM-Evaluation-FINAL-Report-112117.pdf

transportation options are used to track recognition, output, and service quality. Some of the important performance measures are:

Vehicle trips reduced
Vehicle miles of travel (VMT) reduced
Emissions reduced: Nitrogen Oxides (NOx), Volatile Organic Compounds (VOC), Particulate Matter (PM2.5), PM 2.5 pre-cursor NOx, and CO_2 emissions (Greenhouse Gas Emissions - GHG)

Particularly of interest to congestion management is the impact on vehicle trips reduced, vehicle miles of travel (VMT) reduced, and cost effectiveness. Appendix E shows the summary of results for individual terms (i.e., how many daily vehicle trips were reduced and the daily VMT reduced compared to the goals set by Commuter Connections).

Commuter Connections also operates the Commuter Operations Center (COC), providing direct commute assistance services, such as carpool and vanpool matching through telephone and internet assistance to commuters. The Commuter Operations Center also provides transit, bicycling, park and ride lot, and telecommuting information to commuters in the region.

In addition, a variety of surveys (the following lists a subset of them) are conducted by Commuter Connections to follow-up with program applicants and assess user satisfaction on TERMs. These surveys provide data used to estimate program impacts. Some of the surveys, such as the Applicant Placement survey and Guaranteed Ride Home (GRH) Survey, also provide information used by Commuter Connections staff to fine tune program operations and policies.

Commuter Connections Applicant Placement Rate Survey – Since May 1997 Commuter Connections has conducted commuter applicant placement surveys to assess the effectiveness of the Commuter Operations Center and other program components. The surveys assess users' perceptions of and satisfaction with the services provided.

GRH Applicant Survey – Commuters who register with the GRH program or use a one-time exception trip will be surveyed to establish how the availability and use of GRH influenced their decision to use an alternative mode and to maintain that mode. Satisfaction with GRH services also will be polled.

State of the Commute Survey (SOC) – The SOC survey, a random sample survey of employed adults in the Washington metropolitan region, serves several purposes. First, it establishes trends in commuting behavior, such as commute mode and distance, and awareness and attitudes about commuting, and awareness and use of transportation services, such as HOV lanes and public transportation, available to commuters in the region.

Employee Commute Surveys – Some employers conduct baseline surveys of employees' commute patterns, before they develop commuter assistance programs and follow-up surveys after the programs are in place.

Employer Telework Assistance Follow-up Survey – Sent to employers that received telework assistance from Commuter Connections to determine if and how they used the information they received.

Bike-to-Work Day Participant Survey – A survey among registered participants in the Bike-to-Work Day event is undertaken to assess travel behavior before and after the Bike-to-Work Day, as well as commute distance and travel on non-bike days.

Carshare Survey – A survey about the experiences of carshare users and the impact carsharing has on travel patterns in the region. The survey examines characteristics of carshare trips, travel changes

made in response to carshare availability, and auto ownership and use changes in response to carshare availability.

Vanpool Driver Survey – a survey that collects data on van ownership and operation, vanpool use and travel patterns, availability and use of vanpool assistance and support services, and issues of potential concern to vanpool drivers.

Transportation Emission Reduction Measures (TERMs) Evaluation

With the introduction of Clean Air Amendments in the 1990's reducing vehicle emissions became important in the region. Analysis showed that enhancing existing and introducing new demand management strategies will have a two-fold impact; reducing congestion and at the same time reducing emissions and clearing the air of ozone causing pollutants. These programs were called Transportation Emissions Reduction Measures (TERMs) and the regional programs were implemented through the Commuter Connections Program, in concert with program partners to meet air quality conformity and federal clean air mandates. Commuter Connections sets goals on TERM programs that impact commute trips[2], and evaluates the TERMs to determine the impact they are having on reducing congestion and vehicle emissions. These TERMs include:

Guaranteed Ride Home (GRH) – Eliminates a barrier to use of alternative modes by providing free rides home in the event of an unexpected personal emergency or unscheduled overtime to commuters who use alternative modes.

Employer Outreach – Provides regional outreach services to encourage large, private-sector and non-profit employers voluntarily to implement commuter assistance strategies that will contribute to reducing vehicle trips to worksites, including the efforts of jurisdiction sales representatives to foster new and expanded trip reduction programs.

Mass Marketing – Involves a large-scale, comprehensive media campaign to inform the region's commuters of services available from Commuter Connections as one way to address commuters' frustration about the commute. Projects associated with this program include a regional Bike to Work Day event, Car free day event, and the 'Pool Rewards rideshare incentive program.

Both the TERM evaluation and associated surveys are keys to assessing the impact these programs have on congestion management and air quality. Following is a more detailed analysis on the above TERMs and other Commuter Connections demand management strategies in the region.

3.2.1.1 Telework

Teleworking, or telecommuting, can be described as a means of using telecommunications and information technology to replace work-related travel. This can be done by working at one's home, or at a designated telework center one or more days a week. There are designated telework centers throughout the region, in the District, Maryland, and Virginia. Phones, wireless communications, fax machines, and computers make teleworking an easy alternative to getting in a car and driving long distances to an office. Teleworking has shown to boost the quality of life, have economic benefits, reduce air pollution, and ease traffic congestion.

[2] The region has adopted and implemented TERMs other than those in the Commuter Connections program. Some other TERMs, such as for Signal Timing Optimization, may also impact congestion. Others, such as for emissions control equipment on heavy-duty diesel vehicles, impact only emissions.

Telework is a TERM evaluated by Commuter Connections. Telework Outreach is a resource service to help employers, commuters, and program partners initiate telework programs. In evaluating teleworking, several travel changes need to be assessed, including: trip reduction due to teleworking, the mode on non-telework days, and mode and travel distance to telework centers.

Telework impacts are primarily estimated from the State of the Commute survey (SOC) and by surveys conducted of employers directly requesting information from Commuter Connections. The 2016 State of the Commute Technical Report[3] concluded the following regarding teleworking:

Teleworkers accounted for 32% of all regional commuters. That is, workers who travel to a main work location on non-telework days.[4]
An additional 18% of commuters, all who do not currently telework, said they "would and could" telework either regularly or occasionally, that is, they have job responsibilities that could be done while teleworking and would be interested in teleworking, if given the opportunity.
The remaining respondents said they either were not interested in teleworking (9%) or that their jobs could only be performed at their main workplace (41%)
Over half (58%) of the teleworkers surveyed said they teleworked at least one day a week.

3.2.1.2 Employer Outreach

Employer Outreach is aimed at increasing the number of private and non-profit employers implementing worksite commuter assistance programs, and is ultimately designed to encourage employees of client employers to shift from driving alone to alternative modes.

In this TERM, jurisdiction-based sales representatives contact employers, educate them about the benefits commuter assistance programs offer to employers, employees, and the region and assist them to develop, implement, and monitor worksite commuter assistance programs.

The *TERM Analysis Report for FY 2014-2017* estimated the impacts of employer outreach. The following are some noteworthy statistics from that report:

Employers participating in Employer Outreach substantially exceeded the goal, with 2,046 participating employers compared to the goal of 1847.

Estimated daily vehicle trip (102,625) and VMT (1.8 million) reduction exceeded the goals for this TERM.

3.2.1.3 Live Near Your Work

Population and employment growth can be considered beneficial for the region, but with it comes the potential for increased congestion. The trend of employees living further from their job is worsening, creating longer commutes. 'Live Near Your Work' is a program to help bridge the gap between the workplace and home. The program is primarily geared towards employers in an attempt to improve

[3] *Commuter Connections State of the Commute Survey 2016 Technical Survey Report*. Prepared for Metropolitan Washington Council of Governments. Prepared by: LDA Consulting, Washington, DC. In conjunction with: CIC Research, San Diego, CA. June 2017.
https://www.commuterconnections.org/wp-content/uploads/2016-State-of-the-Commute-Report.pdf
[4] Using this base of commuters excludes workers who are self-employed and for whom home is their only workplace.

their employees' work-life balance. In turn, the results of employees living closer to where they work can reduce the number of cars on the road, which ultimately can ease congestion and have positive environmental impacts.

To promote the 'Live Near Your Work' initiative, Commuter Connections provides housing information in an online Employer's Resource Guide. The tool highlights various housing programs and resources available for the Washington area workforce and aims to assist employees with moving closer to where they work. This guide also provides a list of flexible commuter options available through Commuter Connections. Used in tandem, employers have a number of ways to provide the information workers need to make living near and getting to work a reality. Employers can work with their internal staff to find and execute the right fit for their employees, and ultimately help everyone feel "more connected." Employers can find that this can have a true impact on their bottom line.

3.2.1.4 Carpooling, Vanpooling, Ridesharing and other Commuter Resources

Commuter Connections provides information on carpooling, vanpooling, and Ridesharing. These alternative commute methods reduce the amount of single occupant vehicles (SOVs) on the road, which is important to congestion management.

Carpooling is two or more people traveling together in one vehicle, on a continuing basis.

Vanpooling is when a group of individuals (usually long-distance commuters) travel together by van, which is sometimes provided by employers. There are typically three kinds of vanpool arrangements:

Owner-operated vans — An individual leases or purchases a van and operates the van independently. Riders generally meet at a central location and pay the owner a set monthly fee.

Third-party vans — A vanpool "vendor" leases the vanpool vehicle for a monthly fee that includes the vehicle operating cost, insurance, and maintenance. The vendor can contract directly with one or more employees. The monthly lease fee is paid by the group of riders.

Employer-provided vans — The employer (or a group of employers) buys or leases vans for employees' commute use. The employer organizes the vanpool riders and insures and maintains the vehicles. The employer may charge a fee to ride in the van or subsidize the service.

'Pool Rewards - 'Pool Rewards is a special incentive program available through Commuter Connections designed to encourage current drive alone commuters to start ridesharing in the Washington Metropolitan region. Commuters who currently drive alone to work may be eligible for a cash payment through 'Pool Rewards when they start or join a new carpool. If eligible, each carpool member can earn $2 per day ($1 each way) for each day they carpool to work over a consecutive 90-day period. The maximum incentive for the 90-day trial period is $130. Carpools may consist of two or more people. For commuters who drive alone to work and can get between seven and fifteen people together to form a vanpool, they may qualify for a $200 monthly 'Pool Rewards subsidy for the new vanpool. [5]

Ridematching Services enables commuters to find other individuals that share the same commute

[5] http://www.commuterconnections.org/commuters/ridesharing/pool-rewards/

route and can carpool/vanpool together. This provides carpooling options for people who may not know of someone to carpool with, thus broadening the carpooling options

3.2.1.5 Bike To Work Day

Each May thousands of area commuters participate in Bike to Work Day, sponsored by Commuter Connections and the Washington Area Bicyclist Association.[6] The TPB has a Bike to Work Day Steering Committee which coordinates the event each year.

Bike to Work Day encourages commuters to try bicycling to work as an alternative to solo driving. The program has grown enormously attracting 18,700 bicyclists in 2017[7].

Biking and other nontraditional modes are expanded upon in Section 3.2.4.

3.2.1.6 Car Free Day

Each year, Commuter Connections implements a regional Car Free Day[8] campaign that encourages residents to leave their cars behind or to take alternative forms of transportation such as public transit, carpools, vanpools, telework, bicycling or walking.

Car Free Day was first held in FY 2009. In 2017, evaluation results showed that there were over 11,200 individuals that pledged to go "car-free" for this event. In addition, participants pledged to reduce 191,400 vehicle miles of travel as a result of participation in this event. This event will is held on September 22nd each year and is in tandem with the World Car Free Day event. A marketing campaign along with public outreach efforts will be developed to coincide with this worldwide celebrated event.

3.2.2 Local and Other Transportation Demand Management and Traffic Management Activities

Local agencies and organizations, such as local governments and Transportation Management Areas (TMAs) are doing their part to promote alternative commute methods and other demand management strategies. Table 15 provides detailed information on specific ongoing demand management strategies in the Washington region.

[6] http://www.biketoworkmetrodc.org
[7] https://www.commuterconnections.org/wp-content/uploads/Bike-to-Work-Day-2017-Final-Report.pdf
[8] http://www.carfreemetrodc.org/

Table 1: Ongoing State Local Jurisdictional Transportatio	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
Region-wide	Region-wide	WMATA	Public Transportation Improvements	Demand	Metrobus transit	Public bus service available throughout the region. Connects to other modes: Metrorail, commuter rail, park-and-ride lots, etc.	http://wmata.com/bus/
Region-wide	Region-wide	WMATA	Public Transportation Improvements	Demand	Metrorail transit	Public rail services DC, MD, and VA. Connects to commuter rail, Metrobus and local bus systems.	http://wmata.com/rail/
Region-wide	Region-wide	WMATA	Park-and-ride lot improvements	Demand	Metrorail station park-and-ride lots	Parking offered at 42 Metrorail stations.	http://wmata.com/rail/parking/
State/Multi-jurisdictiona l	Maryland State-wide	MDOT	Pedestrian, Bicycle, and Multimodal Improvements	Demand	Maryland Bicycle and Pedestrian Advisory Committee (MBPAC)	Provides information on biking, walking. Master Plan guides bike/ped planning in the State.	http://www.mdot.state.md.us/Planning/Bicycle/BikePedPlanIndex
State/Multi-jurisdictiona l	Maryland State-wide	MDOT	Telecommuting	Demand	MDOT's Telework Partnership with Employers/Telework Baltimore.com program	Offers free teleworking consulting services to Maryland employers. Promotes teleworking.	http://www.mdot.state.md.us/Planning/Telework%20Partnership%20Web%20Page/Telework%20Partnership%20with%20Employers

State/Multi-jurisdictiona l	Maryland State-wide	MTA	Employer outreach / mass marketing	Demand	MDOT's Commuter Choice Maryland	Reaches out to Maryland employers and offers incentives to implement a commuter program.	http://www.commuterchoicemaryland.com/
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
State/Multi-jurisdictiona l	Maryland State-wide	MTA	Public Transportation Improvements	Demand	MDOT's MARC train	Maryland MTAPublic commuter rail serving Montgomery County, Prince William County, Frederick County, and into DC.	https://www.mtamaryland.com/services/marc/index.cfm
State/Multi-jurisdictiona l	Maryland State-wide	MTA	Public Transportation Improvements	Demand	Local bus	Maryland MTA Public bus service throughout Maryland, primarily around the Baltimore-DC area.	https://www.mtamaryland.com/services/bus/routes/bus/
State/Multi-jurisdictiona l	Maryland State-wide	MTA	Public Transportation Improvements	Demand	Commuter Bus	Maryland MTA Commuter bus service in Maryland and DC's inner-ring suburbs.	https://www.mtamaryland.com/services/commuterbus/
State/Multi-jurisdictiona l	District-wide	DDOT	Pedestrian, Bicycle and Multimodal Improvements	Demand	Bicycle and Pedestrian Programs	Committed to providing safe and convenient bicycle and pedestrian access throughout the City.	http://ddot.dc.gov/DC/DDOT/On+Your+Street/Bicycles+and+Pedestrians
State/Multi-jurisdictiona l	District of Columbia, Arlington County, City of Alexandria,	Partnership of DDOT, Arlington County, City of Alexandria, Montgomery County	Bicycle Programs	Demand	Capital Bikeshare	A bikesharing program to encourge the use of bicyles.	http://capitalbikeshare.co m/

	Montgomery County	(Fairfax County – coming soon)					
State/Multi-jurisdictional	District-wide	DDOT	Carsharing Programs	Demand	DDOT Carsharing Initiative	A network of vehicles offered for rent to the public. Allows mobility of a car without owning one.	http://ddot.dc.gov/DC/DDOT/On+Your+Street/Car+Sharing?nav=1&vgnextrefresh=1
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
State/Multi-jurisdictional	District-wide	DDOT	Public Transportation Improvements	Demand	DDOT Mass transit	DDOT helps coordinate mass transit with agencies and WMATA.	http://ddot.dc.gov/ddot/cwp/view,a,1250,q,638123,ddotNav_GID,1586,ddotNav,%7C32399%7C.asp
State/Multi-jurisdictional	Takoma Park and Takoma Park, MD	DDOT	Growth Management	Demand	DDOT's Takoma Transportation Study	A study done for Takoma area of DC and adjacent Takoma Park, MD. Study recommends pedestrian, bicycle, transit, and road improvements.	http://ddot.washingtondc.gov/ddot/cwp/view,a,1249,q,561963.asp
State/Multi-jurisdictional	District-wide	DDOT	District TDM Program	Demand	goDCgo	goDCgo is an initiative of DDOT that is designed to help reduce congestion and improve air quality in the District through the promotion of sustainable transportation modes.	http://godcgo.com/

State/Multi-jurisdictiona l	Downtown DC	Partnership of DDOT, WMATA, and DC Surface Transit	Public Transportation Improvements	Demand	DC Circulator	A public bus system serving the District.	http://www.dccirculator.com/DCCirculator.html#hom e
State/Multi-jurisdictiona l	Virginia-statewide	VDRPT, VDOT	Telecommuting	Demand	Telework!VA	Primary resource for Virginia's employers to start a telework program in VA, promotes teleworking.	http://www.teleworkva.or g/
State/Multi-jurisdictiona l	Northern Virginia	VDOT	Variably Priced HOT Lanes	Demand/0 perational	495 Express Lanes	High occupancy toll (HOT) lanes that use congestion pricing to manage congestion on the Beltway in Virginia	https://www.495expressla nes.com/
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
State/Multi-jurisdictiona l	Northern Virginia	VDOT	Variably Priced HOT Lanes	Demand/ Operational	95 Express Lanes	Construction of high occupancy toll (HOT) lanes that use congestion pricing to manage congestion on the Beltway in Virginia	http://www.vamegaproject s.com
State/Multi-jurisdictiona l	Northern Virginia	VDOT and VDRPT	Transportation Demand Management Program	Demand/ operational	Virginia Megaprojects Regional, Dulles Rail, and 495 and 95 Express Lanes TMP's	Various targeted TDM and transit improvements to mitigate impacts and delays caused by construction of large scale projects in Northern Virginia	http://www.vamegaproject s.com

State/Multi-jurisdictiona l	Northern Virginia	NVRC	Laws and Safety Tips Booklet	Demand	Safety/Outreach	Pocket Booklet	www.bikewalkvirginia.org
State/Multi-jurisdictiona l	Fairfax and Loudoun Co. VA	VDRPT and MWAA	Public Transportation Improvements	Demand	Dulles Corridor Metrorail Project	In cooperation with WMATA and local governments. Construct an extension of Metrorail to Dulles Airport.	http://www.dullesmetro.co m
State/Multi-jurisdictiona l	I-66, I-95/395 HOV lanes	VDOT/NOVA	HOV Lanes	Demand	I-66 HOV Lanes, I-395/I-95 HOV	Lanes available to ridesharers, those carpooling and vanpooling, and transit vehicles	www.VDOT.Virginia.gov
State/Multi-jurisdictiona l	Virginia Statewide	VDRPT and AMTRAK	Public Outreach	Demand	AMTRAK Virginia	Promotes AMTRAK passenger rail service in Virginia	http://www.amtrakvirginia .com
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
State/Multi-jurisdictiona l	Virginia Statewide	VDOT	Traffic Management	Operational	I-66 ATM	Promote safety and congestion management	none
State/Multi-jurisdictiona l	Virginia Statewide	VDOT	TDM and Traffic management	Operational	I-95 ICM	Promote safety and congestion management	none
State/Multi-jurisdictiona l	Loudoun, Fairfax, Arlington, and Prince William Counties	Northern Virginia Transportati on Authority	Public Transportation Improvements	Demand	NVTA's TransAction Regional Transportation Plan	Identifies a number of public transit, travel demand management, and other improvements, including new park-and-ride lots throughout Northern VA.	http://www.thenovaauthor ity.org/projects.html

State/Multi-jurisdictiona l	Loudoun, Fairfax, Arlington, and Prince William Counties	Northern Virginia Transportati on Authority	Alternative Commute Programs	Demand	NVTA's Mission of the Authority	Responsibilities include a general oversight of regional congestion mitigation, including carpooling, vanpooling, and other commute programs	http://www.thenovaauthor ity.org/mission.html
State/Multi-jurisdictiona l	Northern VA and the District of Columbia	VRE	Public Transportation Improvements	Demand	Virginia Railway Express (VRE) Train	Commuter rail serving Northern VA and two stations in the District. Connects to local transit.	http://www.vre.org/index. html
State/Multi-jurisdictiona l	Prince William Co., Manassas, and several locations in VA & DC	PRTC	Public Transportation Improvements	Demand	Potomac and Rappahannock Transportation Commission's (PRTC) OmniRide	Commuter bus service along I-95 and I-66 corridor in Prince William Co., Manassas, and to several locations in VA & DC, including Metrorail stations.	http://www.prtctransit.org /omniride/index.php
State/Multi-jurisdictiona l	Eastern Prince William Co. and Manassas	PRTC	Public Transportation Improvements	Demand	PRTC's OmniLink	A local bus service in Eastern Prince William Co. and Manassas	http://www.prtctransit.org /omnilink/index.php
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
State/Multi-jurisdictiona l	Prince William Co. and Manassas	PRTC	Ridematching Services	Demand	PRTC's OmniMatch	A free ridematching service for carpooler and vanpoolers originating in Prince William Co and Manassas.	http://www.prtctransit.org /omnimatch/index.php

State/Multi-jurisdictiona l	Fairfax, Loudoun, and Prince William Counties	VDOT/NOVA	Park-and-Ride Lots	Demand/ operational	Commuter Park-and-Ride lots	Provides and maintains numerous free park-and-ride lots	www.virginiadot.org/travel/pnrlots.asp
State/Multi-jurisdictiona l	Fairfax, Loudoun, and Prince William Counties	VDOT/NOVA	Bicycle Lockers	Demand/ operational	Bicycle Locker Rental Program	Provides reserved bicycle lockers at several Park-and-Ride lots for an annual rental fee	http://www.virginiadot.org/travel/nova-mainBicycle.asp
State/Multi-jurisdictiona l	Northern Virginia	MWAA	HOV Lanes	Demand	Dulles Toll Road HOV Lanes	Lanes available to rideshares, Those carpooling and vanpooling, And transit vehicles	www.mwaa.com
State/Multi-jurisdictiona l	NOVA	DRPT	Transit and TDM	Demand	SuperNOVA Transit and TDM	Transit/TDM vision planning	none
Multi-jurisdictiona l	Northern Virginia	PRTC in cooporation with NVTC and GWRC	Vanpool Programs	Demand	Vanpool Alliance	Organizes private vanpool providers for NTD reporting. Provides support, ridematching, and general marketing for vanpools in the region.	www.vanpoolalliance.org
Multi-jurisdictiona l	Prince William County, Cities of Manassas and Manassas Park	PRTC	Employer Outreach	Demand	Omni SmartCommute	Provides outreach and support to area employers seeking to implement employee commute assistance programs.	http://www.prtctransit.org/special-programs/employer-services.php

Geography	Location	Local Jurisdiction / Organization	Strategy Name	Operational or Demand Mngt. Strategy	Project/Program Name	Description	Website
State/Local	NOVA	VDOT/Local	Bike Lanes	Demand	Road Diet	Improve safety and mobility	none
County	Throughout Montgomery County	Montgomery County, MD	Park-&-Ride lots: Provision, maintenance & improvements	Demand	Montgomery County Park-and-Ride Lots	Provide park-and-ride lot information in the County.	http://www.montgomerycountymd.gov/tsvtmpl.asp?url=/content/DOT/transit/routesandschedules/brochures/parklots.asp
County	Throughout Montgomery County	Montgomery County, MD	Public Transportation	Demand	Ride On (local bus)	Provides public bus service in Montgomery County. Connects to Metrorail and Metrobus	http://www.montgomerycountymd.gov/dot-transit/
County	Throughout Montgomery County MD	MCDOT/Commuter Services Section	Alternative Commute Programs	Demand	MCDOT TDM Programs & Services - available throughout the County	Provides information on alternative commute options: carpooling, biking, employer incentives, all other TDM services & strategies	http://www.montgomerycountymd.gov/commute
County	Throughout Montgomery County MD	MCDOT/Commuter Services Section & other offices within MCDOT; M-NCPPC	Growth Management	Demand	TDM for Development Review	Coordinates TDM strategies required in new developments	http://www.montgomerycountymd.gov/commute
County	Throughout Montgomery County MD	MCDOT/Commuter Services Section & Traffic	Alternative Commute Programs – Bicycling	Demand	Bicycling Resources	Bike/transit maps for County and individual service areas. Bike resources	http://www.montgomerycountymd.gov/commute http://www2.montgomerycountymd.gov/DOT-

		Engineering Div./Bikeways					DTE/BikeWays/BWHome.aspx
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
County	Throughout Montgomery County MD	MCDOT/Commuter Services Section	Telework Incentive Program	Demand	Telework Resources	Laptops and consulting services available to employers exploring or adopting telework	http://www.montgomerycountymd.gov/commute
County	Throughout Prince George's County	Prince George's County Dept. of Public Works and Trans.	Alternative Commute Programs	Demand	Prince George's County Ride Smart Commuter Solutions	Provides information on commuter services available in Prince George's County.	http://www.ridesmartsolutions.com/
County	Throughout Prince George's County	Prince George's County Dept. of Public Works and Trans.	Park-and-ride lot improvements	Demand	Prince George's County Park-and-Ride Lots	There are 15 free park-and-ride lots available in Prince George's County.	http://www.goprincegeorgescounty.com/Government/AgencyIndex/DPW&T/Transit/park_ride.asp?nivel=foldmenu(2)
County	Throughout Prince George's County	Prince George's County Dept. of Public Works and Transport.	Improving accessibility to multimodal options	Demand	Prince George's County Call-A-Bus	Bus service available to all residents of Prince George's County who are not served by existing bus or rail.	http://www.goprincegeorgescounty.com/Government/AgencyIndex/DPW&T/Transit/bus.asp?nivel=foldmenu(2)

County	Throughout Frederick County	Frederick County, MD	Public Transportation Improvements	Demand	TransIT Services of Frederick County	Public bus and paratransit services.	www.frederickcountymd.gov/transit
County	Throughout Frederick County	Frederick County, MD	Alternative Commute Programs	Demand	TransIT Rideshare (a program within TransIT Services of Frederick County)	TransIT also offers information on alternative commute programs.	www.frederickcountymd.gov/transit
County	Throughout Frederick County	Frederick County, MD	Alternative Commute Programs	Demand	Employer Connection (a program of TransIT Services of Frederick County)	Help business and employees find best transportation solutions	www.frederickcountymd.gov/transit
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
County	Throughout Frederick County	Frederick County, MD	Alternative Commute Programs	Demand	Frederick County Rideshare and Employer Outreach	Provides information on alternative commute programs, and local and regional public transit. Work with Employers to develop commute strategies at their locations.	www.frederickcountymd.gov/transit
County	Throughout Fairfax County	Fairfax County, VA	Public Transportation Improvements	Demand	Fairfax Connector (local bus)	Public bus system in Fairfax County. Connects to Metrorail and bus.	http://www.fairfaxcounty.gov/connector/
County	Throughout Fairfax County	Fairfax County, VA	Alternative Commute Programs	Demand	Fairfax County RideSources Program	Provides information on alternative commute programs.	http://www.fairfaxcounty.gov/fcdot/sources.htm
County	Throughout Fairfax County	Fairfax County, VA	Alternative Commute Programs	Demand	Fairfax County Employer Services Program	Help business and employees find best transportation solutions	http://www.fairfaxcounty.gov/fcdot/employer.htm

County	Throughout Fairfax County	Fairfax County, VA	Alternative Commute Programs	Demand	Fairfax County Bike Program	A comprehensive bicycle initiative and program committed to making Fairfax County bicycle friendly	http://www.fairfaxcounty.gov/fcdot/bike/
County	Throughout Fairfax County	Fairfax County, VA	Alternative Commute Programs	Demand	Fairfax County Pedestrian Program	A comprehensive Pedestrian Program to provide dedicated resources to meet specific pedestrian goals	http://www.fairfaxcounty.gov/fcdot/pedestrian/
County	Throughout Fairfax County	Fairfax County, VA	Alternative Commute Programs	Demand	Bicycling Resources	Bike / Transit Maps for County and individual service areas. Bike resources	http://www.fairfaxcounty.gov/fcdot/bike/
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
County	Throughout Fairfax County	Fairfax County, VA	Alternative Commute Programs	Demand	Shuttlepool program	High occupancy shuttle service offered to employers with staff that commute more that 20 miles away	http://www.fairfaxcounty.gov/fcdot/employer.htm
County	Throughout Fairfax County	Fairfax County, VA	Alternative Commute Programs	Demand	Commuter-Friendly Communities	Program that works with residential properties to implement TDM programs that are tailored for that location	http://www.fairfaxcounty.gov/fcdot/tdm/cfc.htm
County	Throughout Fairfax County	Fairfax County, VA	Bicycle Programs	Demand	Bike Benefit Match Program	Fairfax employers can receive a 50% match in funding for implementing a new bike benefit program	http://www.fairfaxcounty.gov/fcdot/bike/bikebenefit.htm

County	Throughout Fairfax County	Fairfax County, VA	Vanpool Assistance	Demand	Van Start Van Save	Vanpool funding assistance used to temporarily fill empty seats for start up and vans that are losing ridership	http://www.fairfaxcounty.gov/fcdot/vanassist.htm
County	Throughout Fairfax County	Fairfax County, VA	Rideshare Matching	Demand	Employee Density Plots	GIS density maps that are used to promote ridesharing by identifying staff within a close proximity	http://www.fairfaxcounty.gov/fcdot/employer.htm
County	Throughout Fairfax County	Fairfax County, VA	Employer Outreach	Demand	Transportation Services Group	Reaches out to Fairfax employers and offers incentives to implement a commuter program	http://www.fairfaxcounty.gov/fcdot/employer.htm
County	Throughout Fairfax County	Fairfax County, VA	Employer Outreach	Demand	Employer Lunch and Learn Session	Lunchtime presentations to promote TDM programs to employer staff members.	http://www.fairfaxcounty.gov/fcdot/employer.htm
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
County	Throughout Fairfax County	Fairfax County, VA	Parking Management	Demand	Rideshare Preferred Parking	Employer assistance in creating preferred parking for staff members that rideshare to work	http://www.fairfaxcounty.gov/fcdot/employer.htm
County	Throughout Fairfax County	Fairfax County, VA	Residential Commuter Site Awards	Demand	Commuter-Friendly Communities Awards	Bronze, Silver, Gold and Platinum award status for residential sites that have reached specific TDM level status	http://www.fairfaxcounty.gov/fcdot/tdm/cfc.htm

County	Throughout Fairfax County	Fairfax County, VA	Employer Awards	Demand	Fairfax County Best Workplaces for Commuters Awards	National & local recognition awards for Fairfax County employers who have established level 3 or 4 TDM programs	http://www.bestworkplaces.org/employers/fairfax/
County	Throughout Fairfax County	Fairfax County, VA	Transit	Demand	Fairfax Transit	Study countywide transit needs	http://www.fairfaxcounty.gov/FCDOT/2050TransitStudy
County	Throughout Arlington County	Arlington County, VA	Public Transportation Improvements	Demand	Arlington Transit (ART)	Public bus service in Arlington. Connects to Metrorail and bus.	http://www.commuterpage.com/art/
County	Throughout Arlington County	Arlington County, VA	Alternative Commute Programs	Demand	Getting Around Arlington	Provides information on alternative commute programs, and public transit.	http://www.commuterpage.com/art/villages/arl_tran.htm
County	Throughout Arlington County	Arlington County, VA	Pedestrian, Bicycle and Multimodal Improvements	Demand	Arlington's BikeArlington	Initiative to encourage more people to bike often.	http://www.bikearlington.com/about.cfm
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
County	Throughout Arlington County	Arlington County, VA	Alternative Commute Programs	Demand	Arlington's Car-Free Diet	Promotes alternative commute methods.	http://www.carfreediet.com/
County	Throughout Arlington County	Arlington County, VA	Promote Alternate Modes	Demand	WALKArlington	Promotes walking as an alternative mode.	http://www.walkarlington.com/about/index.html

County	Throughout Arlington County	Arlington County, VA	Alternative Commute Programs	Demand	Arlington County's CommuterPage.com	Provides information on transportation options in Arlington and the DC area.	http://www.commuterpage.com/
County	Throughout Arlington County	Arlington County, VA	Growth Management	Demand	Arlington County's TDM Management for Site Plan Development	Coordinates site plan development (proposed land use) with commuter and transit services.	http://www.commuterpage.com/TDM/
County	Throughout Loudoun and from Loudoun to DC	Loudoun County, VA	Public Transportation	Demand	Loudoun County Transit	Commuter bus service from Loudoun Co. to Arlington and downtown DC.	http://inter4.loudoun.gov/Default.aspx?tabid=969
County	Throughout Loudoun County	Loudoun County, VA	Park-and-ride lot improvements	Demand	Loudoun's Free Park-and-Ride lots	Free park-and-ride lots are available throughout the County.	http://inter4.loudoun.gov/Default.aspx?tabid=959
County	Throughout Loudoun County	Loudoun County, VA	Alternative Commute Programs	Demand	Loudoun's Commuting options	Provides information on alternative commute programs and transit options.	http://inter4.loudoun.gov/Default.aspx?tabid=789
County	Throughout Loudoun County	Loudoun County, VA	Employer Outreach/Services	Demand	Loudoun's Employer Services	Helps businesses identify commuting solutions for employees in Loudoun County	http://inter4.loudoun.gov/Default.aspx?tabid=984
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**

County	Throughout Southern Loudoun and in Northern Loudoun to Purcellville	Virginia Regional Transit (in cooperation with Loudoun Co.)	Local Fixed Route Bus Service	Demand	Loudoun County	Public bus service within Loudoun County.	http://inter4.loudoun.gov/Default.aspx?tabid=898
County	Throughout Prince William County	Prince William County, VA	Park-and-ride lot improvements	Demand	Prince William County Commuter Parking Lots	Work with VDOT and provide convenient sites to encourage residents to use transit or carpool.	http://www.pwcgov.org//default.aspx?topic=010017001530000797
City	The length of College Park, MD	City of College Park, MD	Pedestrian, Bicycle and Multimodal Improvements	Demand	College Park Trolley Trail	Trail is to run the length of the City of College Park, in the old trolley right-of-way.	http://www.thewashcycle.com/college_park_trolley_trail/
City	Throughout Greenbelt	City of Greenbelt, MD	Public Transportation Improvements	Demand	Greenbelt Connection	A local bus in Greenbelt; runs upon request.	http://www.greenbeltmd.gov/public_works/connection.htm
City	Throughout City of Frederick	City of Frederick, MD	Pedestrian, Bicycle and Multimodal Improvements	Demand	Frederick Shared use paths	Promotes the use of, and creates new shared use paths.	https://www.cityoffrederick.com/232/Transportation
City	Throughout Falls Church and to the Metro stations	City of Falls Church, VA	Public Transportation Improvements	Demand	Falls Church GEORGE	Local bus system providing service to East and West Falls Church Metrorail stations and throughout the City of Falls Church.	http://www.fallschurchva.gov/Content/CultureRecreation/GEORGEmain.aspx
City	Throughout Alexandria	City of Alexandria, VA	Alternative Commute Programs	Demand	Local Motion	Promotes use of alternative modes.	www.Alexandriava.gov/LocalMotion

Geography	Location	Local Jurisdiction / Organization	Strategy Name	Operational or Demand Mngt. Strategy	Project/Program Name	Description	Website
City	Throughout Alexandria	City of Alexandria, VA	Public Transportation Improvements	Demand	Alexandria DASH	Local bus system. Connects to Metrobus and Metrorail, VRE, and other local bus systems.	http://www.dashbus.com/
City	Throughout Alexandria	City of Alexandria, VA	Growth Management	Demand	Transportation Management Plans for Site Plan Developments	Coordinates site plan development (proposed land uses) with commuter and transit services.	www.Alexandriava.gov/65 56
City	Throughout Alexandria	City of Alexandria, VA	Improving accessibility to multimodal options	Demand	Alexandria Transit Store	Provides resources and retail transactions for multimodal travel	www.Alexandriava.gov/11 144
City	Throughout City of Fairfax	City of Fairfax, VA	Public Transportation Improvements	Demand	City of Fairfax's CUE	Public bus service within City of Fairfax. Also connects to Vienna Metrorail station.	http://www.fairfaxva.gov/ CUEBus/CUEBus.asp
Local / Corridor- based	Along the corridor between Baltimore and DC	BWI Business Partnership	Alternative Commute Programs	Demand	BWI Business Partnership Commuter Resources	Provides information on commuter programs available to the BWI area.	http://www.bwipartner.or g/index.php?option=com_c ontent&task=view&id=21& Itemid=59
Local / Corridor- based	Downtown Bethesda Transportat ion Managemen t District (TMD)	MCDOT/Co mmuter Services Section with contractor: Bethesda Transportati	Alternative Commute Programs	Demand	Bethesda TMD	Provides information on alternative commute options: carpooling, biking, employer incentives	http://www.bethesdatransi t.org/

		on Solutions (BTS)					
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
Local / Corridor- based	Downtown Bethesda Transportation Management District (TMD)	MCDOT with contractor: Bethesda Urban Partnership (BUP)	Public Transportation Improvements	Demand	Bethesda Circulator	Downtown Bethesda Circulator Bus	http://www.bethesda.org/parking/circulatorinfo.htm
Local / Corridor- based	North Bethesda TMD	MCDOT/Commuter Services Section with contractor: North Bethesda Transportation Center	Alternative Commute Programs	Demand	N. Bethesda TMD	Provides information on alternative commute options: carpooling, biking, employer incentives	http://www.nbtc.org
Local / Corridor- based	Friendship Heights TMD	MCDOT/Commuter Services Section (CSS)	Alternative Commute Programs	Demand	Friendship Heights TMD	Provides information on alternative commute options: carpooling, biking, employer incentives	http://www.montgomerycountymd.gov/commute

Local / Corridor- based	Silver Spring TMD	MCDOT/Commuter Services Section (CSS)	Alternative Commute Programs	Demand	Silver Spring TMD	Provides information on alternative commute options: carpooling, biking, employer incentives	http://www.montgomerycountymd.gov/commute
Local / Corridor- based	Greater Shady Grove TMD	MCDOT/Commuter Services Section (CSS)	Alternative Commute Programs	Demand	Greater Shady Grove TMD	Provides information on alternative commute options: carpooling, biking, employer incentives	http://www.montgomerycountymd.gov/commute
Geography	**Location**	**Local Jurisdiction / Organization**	**Strategy Name**	**Operational or Demand Mngt. Strategy**	**Project/Program Name**	**Description**	**Website**
Local / Corridor- based	Loudoun, Fairfax, and Prince William Counties	Dulles Area Transportation Association (DATA)	Alternative Commute Programs	Demand	DATA Commuter Resources	Advocates for alternative commute programs, transit needs, and transit-oriented development.	http://www.datatrans.org/about.html
Local / Corridor- based	Reston	LINK	Alternative Commute Programs	Demand	Reston's LINK Commuter Resources	Provides information on carpooling, vanpooling, and regional bus schedules.	http://www.linkinfo.org/index.cfm
Local / Corridor- based	Tyson's Corner area	Tyson's Transportation Association (TYTRAN)	Alternative Commute Programs	Demand	TYTRAN's Commuter Resources	Provides information on carpooling, vanpooling, park-and-ride lots, and telework locations.	http://www.tytran.org/index.htm
Local / Corridor- based	Northern VA - Loudoun, Fairfax,	Northern Virginia Transportation	Public Transportation Improvements	Demand	NVTC Research on public transit and HOV performance	NVTC compiles data on regional transit systems and HOV performance.	http://www.thinkoutsidethecar.org/transit.asp

	Prince William	Commission (NVTC)					
Local / Corridor- based	Northern VA - Loudoun, Fairfax, Prince William	Northern Virginia Transportation Commission (NVTC)	Alternative Commute Programs	Demand	NVTC Commuter Info	Provides information on how to use the region's transit system, bicycle and pedestrian options, HOV schedules, and park-and-ride lots.	http://www.thinkoutsidethecar.org/info.asp
Local / Corridor- based	Eastern Arlington's Potomac Yard neighborhood	Full Access Solutions in Transportation (FAST) for Potomac Yard	Growth Management	Demand	Non-profit, developer-initiated FAST	Aims at reducing single-occupant trips to the growing Potomac Yard area. Promotes transit, biking, walking. Offers discounted Metrobus shuttle.	http://fastpotomacyard.com/index.html

3.2.3 TRANSIT SYSTEMS

Transit systems can improve the operation of existing roadways and systems by carrying more passengers than a single-occupant vehicle. They can also be considered demand management strategies in that they can influence a person's traveling behavior and convince them to leave their car at home. Many of the transit systems in the region are operated by transit agencies or local government agencies, including:

- *Alexandria DASH*, a local bus service in Alexandria, Virginia
- *Arlington Transit (ART)*, a bus service in Arlington County, Virginia
- *Bethesda Circulator*, a downtown Bethesda bus service
- *Central Maryland Regional Transit,* a bus service for the City of Laurel and a portion of Prince George's County, with additional services in Anne Arundel and Howard Counties.
- *CUE in City of Fairfax*, a bus service in City of Fairfax, Virginia
- *DC Circulator* bus, serving downtown District of Columbia
- *Fairfax Connector*, a bus service in Fairfax County, Virginia
- *Frederick County TransIT*, a bus service in Frederick County, Maryland
- *Greenbelt Connection*, bus serving Greenbelt upon request
- *Loudoun County Transit* operates commuter bus services from Loudoun to destinations that include West Falls Church Metro, Rosslyn, the Pentagon, and Washington, D.C., as well as providing services from West Falls Church Metro to and among employment sites in Loudoun County.
- *Maryland Transit Administration (MTA) MARC* train commuter rail, serving District of Columbia and Maryland
- *Montgomery County Ride On*, a local bus service in Montgomery County, Maryland
- *MTA Commuter Bus* provides 19 privately contracted Commuter Bus routes which provide 427 trips throughout Maryland's Washington D.C., suburbs including service from far reaching suburbs in Howard, Anne Arundel, Queen Anne's, and Charles Counties to Washington, D.C.
- *Potomac and Rappahannock Transportation Commission (PRTC),* providing *OmniLink,* a local bus service in Eastern Prince William County and Manassas, and *OmniRide,* commuter bus services offering service from locations throughout Prince William County and the Manassas and Gainesville areas to destinations that include the Vienna, West Falls Church and Franconia/Springfield Metrorail Stations, the Pentagon, Crystal City, Rosslyn/Ballston, downtown Washington, D.C., Capitol Hill, and the Washington Navy Yard.
- *Prince George's County Call-A-Bus*, serving those in Prince George's County not served by existing bus or rail
- *Prince George's County TheBus*, serving Prince George's County
- *Virginia Railway Express (VRE)* commuter rail serving Virginia and District of Columbia
- *Virginia Regional Transit* (in cooperation with Loudoun County Transit), a bus service in Loudoun County, Virginia
- *Washington Metropolitan Area Transit Authority (WMATA) Metrobus*, serving the entire Washington metropolitan area
- *Washington Metropolitan Area Transit Authority (WMATA) Metrorail*, serving the entire Washington metropolitan area

While these transit systems are individually very important strategies, it is important to note that they work together to form an entire transit network important to our congestion management system. They work well with other strategies as well, such as VPLs and HOV lanes. In addition, with the help of

Intelligent Transportation System (ITS) technologies, Advanced Traveler Information Systems and providing buses with bicycle racks, transit can be even more appealing to travelers.

The latest (2007/2008) regional household travel survey revealed that commuting transit modal share increased from 15.1% in 1994 to 17.7%, and daily transit modal share increased from 5.5% in 1994 to 6.1%[9]. These increases reflect the positive effect of the region's longstanding efforts to promote transit usage.

3.2.3.1 Significant Transit Construction and Capacity Increases

The first phase of Metrorail's Silver Line opened on July 25, 2014. The 11.4-mile segment begins at the existing West Falls Church Station and includes five stations: McLean, Tysons Corner, Greensboro, Spring Hill and Wiehle-Reston East. Phase 2 with service to Dulles Airport is scheduled to begin in several years.[10]

The Crystal City-Potomac Yard Transitway, the region's first bus rapid transit (BRT) lanes, opened the first section in Alexandria on August 23, 2015 and the second section in Arlington on April 17, 2016.[11] The five-mile line is partially funded by an $8.5 million TIGER grant awarded to the TPB in 2010 for construction of the 0.8 mile segment between East Glebe Road and Potomac Avenue.[12] The BRT service will be run by WMATA and feature frequent service, off-board fare collection, and level boarding.[13]

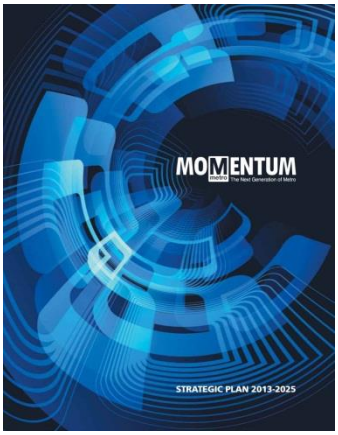
The first line in DDOT's streetcar system opened on February 27, 2016.[14]. The 2.4 mile H/Benning Line has eight stops on H St. NE and Benning Road between Union Station and Oklahoma Ave.[15] The line is the first segment in DDOT's 30-year, 37 mile streetcar vision. No fare will be collected for the first six months and after that the streetcars will feature off-board fare collection and level boarding. As part of the streetcar project, new contraflow bike lanes were installed along G St and I St NE to provide an alternative for cyclists who travel on H St.

Section 3.4.2 discusses technology-related transit projects such as bus priority systems.

3.2.3.2 Future Transit Planning

[9] A presentation of the 2007/2008 Household Travel Survey, May 19, 2009.
http://www.mwcog.org/uploads/committee-documents/YV5cV1ZX20090520110217.pdf
[10] http://silverlinemetro.com/sv-about/
[11] http://www.alexandrianews.org/2016/04/new-bus-lanes-in-crystal-city-potomac-yard-open-for-service/
[12] https://www.mwcog.org/transportation/weeklyreport/2012/10-09.asp
[13] https://www.alexandriava.gov/tes/info/default.aspx?id=58644 (Accessed April 10, 2014)
[14] https://www.washingtonpost.com/local/trafficandcommuting/dc-streetcar-makes-its-first-voyages-on-h-street-is-it-really-happening/2016/02/27/bd0c3234-dd5b-11e5-891a-4ed04f4213e8_story.html
[15] http://www.dcstreetcar.com/projects/hbenning/

In 2013, WMATA released *Momentum,* its strategic plan for 2013-2025.[16] The plan is built around four major goals: (1) build and maintain a premier safety culture and system, (2) meet or exceed expectations by consistently delivering quality services, (3) improve regional mobility and connect communities, and (4) ensure financial stability and invest in [its] people and assets. The plan includes Metro 2025, a list of seven "pivotal investments" by 2025 to improve existing service and enhance travel in the region's core. These investments include 8-car trains on all lines during rush hour and new connections between busy stations. WMATA estimates that the increased capacity from Metro 2025 will remove 100,000 car trips from the region's road network daily while providing transit riders with an improved travel experience.[17]



3.2.3.3 University Transit Systems

Many area universities have their own transit systems for students, faculty, staff, and in some cases, visitors. These shuttle systems increase transit options for the university community and help reduce congestion on campus roads. Two examples of university transit systems are Shuttle-UM system at the University of Maryland, College Park and Masons Shuttles at George Mason University. The Shuttle-UM system is one of the nation's largest University transit services[18] with a fleet of 74 vehicles, including hybrid and clean diesel vehicles, and a ridership of 3,304,212 during FY 2015.[19] Mason Shuttles has five routes including connections to the Vienna Metrorail Station and the Burke VRE station. The George Mason shuttle system has an annual ridership of nearly 600,000 per year.[20] Both universities are providing riders with real-time bus arrival information.

3.2.3.4 DC streetcar

"dcstreetcar" is currently a free single line street car operation running along H street and Benning road for 2.2 miles. Headways are 15 minutes and the line operates 7 days a week and 365 days with extended hours during Friday and Saturday. There are tentative plans to build a second line called the Anacostia Line.

3.2.4 Pedestrian and Bicycle Transportation

Walking and bicycling are garnering more attention as having positive environmental and health benefits. As a part of the region's transportation network, these activities impact congestion management as well. There are a number of things the Washington region is doing to enhance the area of bicycle and pedestrian transportation to encourage non-motorized transportation.

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[16] http://www.wmata.com/momentum/momentum-full.pdf
[17] http://www.mwcog.org/news/press/detail.asp?NEWS_ID=709
[18] http://www.transportation.umd.edu/shuttle.html (Accessed April 301, 2016)
[19] University of Maryland Department of Transportation Services 2015 Annual Report http://www.transportation.umd.edu/about/Annual%20Reports/Annual%20Report%202015_web.pdf
[20] Josh Cantor, "Parking and Transportation Overview," August 2015 http://transportation.gmu.edu/pdfs/2014_2015/PT%20Budget%20and%20Program%20Overview%20Aug%202015%20081015%20final.pdf

- The TPB adopted an updated "Bicycle and Pedestrian Plan for the National Capital Region" in January 2015.[21] Both the TPB and COG recognize the congestion reductions benefits of bicycling and walking.

- Most of the area's local governments have adopted bicycle, pedestrian, trail plans, and/or policies. Bicycle or pedestrian coordinators and trail planners are now found at most levels of government.

- On May 16, 2012, the TPB approved the "Complete Streets Policy for the National Capital Region" which is a directive to all of the TPB member jurisdictions to ensure safe and adequate accommodation, in all phases of project planning, development, and operations, of all users of the transportation network in a manner appropriate to the function and context of the relevant facility.[22]

- Most of the region's transit agencies have bike racks on their buses. WMATA allows bikes on rail outside rush hour and on weekends.

- MARC allows collapsible bicycles on all trains. MARC began allowing full-size bicycles on some weekend Penn Line trains in December 2014. In September 2014, that service was expanded to six of nine roundtrip Saturday trains and all six roundtrip Sunday trains. There are 23 racks on board and no additional charge for bicycles.[23]

- VRE allows collapsible bicycles on all trains. VRE allows up to two full size bicycles on the last three northbound trains, the midday train, and the last three southbound trains on each line.[24]

- Secure, covered bicycle parking facilities including Bikestation Washington DC[25] adjacent to Union Station and WMATA's Bike and Ride facility at the College Park Metro Station[26] provide more convenience for multi-mode travelers.

- Local governments are starting to require bicycle parking, as well as provide free on-street racks. DC requires bike parking in all buildings that offer car parking.

- In accordance with federal guidance and new state policies, pedestrian and bicycle facilities are increasingly being provided as part of larger transportation projects. A number of local jurisdictions have implemented transit-oriented developments (TODs) and other walkable communities.

- VDOT has altered its secondary street acceptance requirements to mandate that streets built by private developers connect with adjacent streets and future developments in a manner that enhances pedestrian and bicycle access, and that adds to the capacity of the transportation system. Residential streets may be narrower and incorporate traffic calming features.
- Employers are investing in bike facilities at work sites, and developers are including paths in new construction.

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[21] http://www.mwcog.org/uploads/pub-documents/pV5bW1420150227152434.pdf
[22] http://www.mwcog.org/uploads/committee-documents/mV1dXl9e20120510092939.pdf
[23] http://mta.maryland.gov/news/mta-doubles-bike-car-service-marc-weekend-penn-line
[24] http://www.vre.org/service/rider/policies/
[25] http://home.bikestation.com/washingtondc
[26] http://www.wmata.com/about_metro/news/PressReleaseDetail.cfm?ReleaseID=5225

- Specific bicycle/pedestrian campaigns are developing to encourage biking/walking, such as WALKArlington, Localmotion, and GoDCGo.[27]

- The Safe Routes to School program, which is administered through the States, provides funding for both hard and soft improvements and programs to encourage children to walk or bicycle to school, improve safety, and reduce congestion and air pollution near schools. Under the new federal transportation bill, MAP-21, the Safe Routes to School program was combined with two other former federal programs that fund non-motorized transportation, Transportation Enhancement (TE) and Recreational Trails, to form the Transportation Alternatives Program. This program, which is administered by the States and the National Capital Region Transportation Planning Board, provides funds for bicycle and pedestrian facilities, complete streets, safe routes to schools, and environmental mitigation.

- Commuter Connections offers turn-by-turn bicycle routing directions using bicycle-friendly paths and roads. **Registration is required.** More and better on line bike and walk routing resources have also become available from the private sector. Google Maps offers both walk and bike routing features. Otherbike routing resources for the Washington region include Car Free A to Z and Map My Ride>
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Bicycle and pedestrian plans and projects are widespread throughout the Washington region. For example, in the District of Columbia, DDOT has built 80 miles of bike lanes since 2000, and the city has a goal of expanding to 136 miles by 2040, the majority of them fully protected.[28] The city has built four miles of bike lane so far in 2018, and hopes to finish six more.

Better bike infrastructure in DC has led to more bicycling. Nearly 17,000 cyclists regularly rode their bikes to work in Washington, D.C. in 2016, according to Census estimates, which is about 5 percent of the city's commuters. That's nearly triple the mode share it had in 2006, putting it in second place on the list of top biking cities in the U.S., just behind Portland, Oregon.[29]

Other jurisdictions are following the District's example, adding bike lanes and trails. Maps of bike facilities can be found at dcbikemap.com and at BikeArlington.com.

Bicycling and walking have an even greater potential to grow as modes of transportation. Many trips taken by automobile could potentially be taken by bicycle. This is especially true in areas such as Activity Centers where a number of trips are more easily switched from motorized transportation to walking. Many people who live far from their jobs, but closer to transit or a carpool location could walk or bike to transit or the carpool instead of driving. When considering the following statistics, switching from a motor vehicle or bicycling or walking is feasible[30]:

- The median work trip length for all modes in the TPB Planning area is 9.3 miles.
- Twenty-five percent of commute trips are less than 4.3 miles, a distance most people can cover by bicycle.

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[27] http://www.walkarlington.com/
[28] https://www.citylab.com/transportation/2017/12/how-washington-dc-built-a-bike-boom/548903/
[29] https://www.citylab.com/transportation/2017/12/how-washington-dc-built-a-bike-boom/548903/
[30] Griffiths, R. E. 2007/2008 Household Travel Survey: Presentation of Findings on Weekday Travel. Presentation to the Technical Committee of the National Capital Region Transportation Planning Board on May 1, 2009

- The median auto driver trip (for all purposes) is only 4 miles, and 25% of all auto driver trips are less than 1.5 miles.
- Auto passenger trips, often children being taken to school, are even shorter, with a median trip distance of 2.8 miles, and 25% of trips less than 1.2 miles.

In August of 2012, the Transportation Planning Board (TPB) received $200,000 through the Federal Highway Administration's Transportation, Community and System Preservation (TCSP) Grant Program to identify strategic recommendations to increase ridership at underutilized rail stations with strategic bicycle and pedestrian access improvements.. The final product of the project identified a set of pedestrian and bicycle capital projects that could be quickly implemented in the vicinity of rail stations with available ridership capacity that are anticipating employment growth in the near-term future and/or have significant transit-dependent populations living in close proximity. That study identified over 3,000 recommendations for a range of physical infrastructure improvements and policies and programs to encourage multimodal trips.

The Surface Transportation Block Grant Program Set-Aside is a federal program under the 2015 FAST act that provides funding for projects considered alternative to traditional highway capacity expansion. The Set-Aside is the new iteration of the Transportation Alternatives Program from 2012's MAP-21. Similar to the Transportation Alternatives Program, the Set-Aside allows large MPOs, including the Transportation Planning Board, to play a role in project selection for a portion of program funds that will be sub-allocated to large metropolitan regions. For the National Capital Region, this new program offers an opportunity to fund regional priorities and complement regional planning activities. Projects approved for FY 2015 and FY 2016 include expansion of a "Hiker-Biker trail route in Rockville, late stage design funding for the Cinderbed Road Bikeway in Fairfax County, and a trail along the District of Columbia's SE Waterfront connecting to the historic Seafarer's Yacht Club..[31]

Supporting bicycle and pedestrian planning is important to congestion management. Each additional person walking or biking for a trip is one less person on the road, thus easing congestion. Pedestrian and bicycle facility planning is something that will continue to be considered in the realm of congestion management, not only as a stand-alone area, but in conjunction with transit projects and land use planning.

Bikesharing

Capital Bikeshare, opened in September 2010 with 1100 bikes at 110 stations. The public-private partnership has since expanded to Arlington County, the City of Alexandria, Montgomery County, Fairfax County, and Prince George's County with over 4300 bicycles and over 500 stations.[32] The Capital Bikeshare smartphone app allows users to see bicycle and dock availability.

The results of a survey[33] of Capital Bikeshare members conducted during November 2014 provided information on travel changes made in response to Capital Bikeshare availability. According to the survey report, bikeshare provides an additional transportation option to members to make trips that they may not have made in the past because it was too far to walk. More

[31] www.mwcog.org/tap (Accessed April 30, 2016)
[32] http://capitalbikeshare.com/hom e (Accessed April 30, 2016)
[33] 2014 Capital Bikeshare Member Survey Report prepared by LDA Consulting, April 3, 2015 http://www.capitalbikeshare.com/assets/pdf/cabi-2014surveyreport.pdf

than half of Capital Bikeshare members do not have access to a car or personal vehicle. The survey found that bikeshare plays a role on multimodal transportation. When asked about their travel during the previous month, 64% of members used bikeshare to access a Metrorail station, 21% accessed a Metrorail station six or more times, and 24% used bikeshare to access a bus. The availability of bikeshare allows its members to switch trips to bike from other modes.

The City of College Park, in partnership with the University of Maryland, launched its own bikeshare system in partnership with the University of Maryland on May 4, 2016. The bikeshare system is operated by Zagster and has 163 bikes and 21 stations.[34] University Park joined the system in May 2017.[35]

The city chose Zagster as its bikeshare vendor after plans to join Capital Bikeshare fell through in 2014 due to the bankruptcy filing by Capital Bikeshare's operator, Alta Bicycle Share, in 2014.[36]

DOCKLESS BIKESHARE THE DISTRICT OF COLUMBIA AND MONTGOMERY COUNTY ARE PILOTING ANOTHER FORM OF BIKE SHARING CALLED DOCKLESS BIKESHARING. DOCKLESS BIKE (AND VEHICLE) SHARE IS DIFFERENT FROM FIXED-STATION SYSTEMS LIKE CAPITAL BIKESHARE. DOCKLESS VEHICLES OPERATE AND ARE PARKED IN THE PUBLIC RIGHT OF WAY BUT ARE OWNED AND MANAGED BY PRIVATE COMPANIES. USERS FIND THE GPS-EQUIPPED BIKES WITH A SMARTPHONE APP AND USE THE APP TO UNLOCK THE BIKE. FEES ARE CHARGED PER HALF HOUR OF USE TO THE USER'S CREDIT CARD. THERE IS TYPICALLY NO UPFRONT COST OR MEMBERSHIP FEE. THE BIKES CAN BE LEFT PARKED ON THE SIDEWALK SO LONG AS THEY DO NOT BLOCK THE SIDEWALK, BUS STOPS, WHEELCHAIR RAMPS, OR DRIVEWAYS.

DDOT's Dockless Bike Share Demonstration Project, which began in September 2017, will run through August 2018. Seven private companies are currently operating in the District. Jump, Spin, Ofo and Mobike operate bicycles only. Waybots and Bird operate electric scooters. Limebike has both scooters and bikes. Dockless companies are allowed a total of 400 vehicles per operator. Roughly 2000 dockless bikes are currently operating in the District.

Montgomery County's pilot program covers the area near Silver Spring and Takoma Park, inside the beltway. The county signed agreements with four dockless bike share companies, inlcluding Limebike, Mobike, Ofo, and Spin to conduct the pilot Dockless Bike Share project. There are currently no limits on the numbers of bicycles that could be deployed under the agreement. About 460 are on the streets now. The program debuted on October 26, 2017, with an initial six month trial period.
Other jurisdictions are considering permitting dockless bike share.

3.2.5 CAR SHARING

Carsharing is a model of car rental where people rent cars for short periods of time, often by the hour. This supports residents, especially in densely populated urban environments, who make only occasional use of a vehicle, as well as others who would like occasional access to a vehicle of a different type than they use day-to-day. Urban car sharing is often promoted as an alternative to owning

[34] http://zagster.com/mbike/
[35] https://www.zagster.com/press/blog/university-of-maryland-and-city-of-college-park-expand-popular-mbike-bike-share-program
[36] https://www.washingtonpost.com/local/trafficandcommuting/capital-bikeshare-expansion-hindered-by-bankruptcy-of-montreal-based-bike-vendor/2014/04/12/d42c8a2a-bf23-11e3-b195-dd0c1174052c_story.html?tid=a_inl

a car in dense, walkable, mixed-use development communities, where public transit, walking, and cycling can be used most of the time and a car is only necessary for out-of-town trips, moving large items, or special occasions. It can also be an alternative to owning multiple cars for households with more than one driver.[37]

Carshare companies follow one of two basic models. The firsthas designated parking spaces for each vehicle, and the vehicle must be returned to that location at the end of the rental. The second, has a home area defined where users can park the vehicle in any legal public parking space at the end of the rental, allowing for one-way or point-to-point trips. Smartphone apps are available for all of the major carshare companies to locate and reserve cars. The largest carshare company in the region, Zipcar, has over 800 vehicles in the area. Enterprise also operates carsharing in the region. A point-to-point carshare company, Car2Go, has over 300 vehicles in the District of Columbia and Arlington.

Jurisdictions work with the car share companies to arrange for parking permitting. For example, the District of Columbia provides on-street spaces, at a cost, for carshare vehicles, and encourages developers to provide off-street car share spaces in conjunction with new development. In November 2013, the DDOT began a program which allows carshare companies to purchase parking permits which allow their vehicles to be parked in Residential Parking Permit zones.[38] Arlington County provides information on carsharing on its Commuter Page website.[39]

App-based or ridehailing car services, such as Uber and Lyft (also called as transportation network companies), are different from carsharing as they operate more like a taxi service.. According to the American Public Transportation Association (APTA), the more people use shared modes, the more likely they are to use public transportation, own fewer cars, and spend less on transportation overall. In addition, shared modes complement public transit and enhance urban mobility. It is unclear at this time how ridehailing services will affect transportation planning or contribute to congestion reduction in the region. The next CMP Technical Report will continue to monito the potential impact of ridehailing services.[40] Based on literature and data analysis performed by others it is estimated as much as 250,000 trips a day maybe carried by TNC's in the region. Anecdotal evidence suggests in downtown core they maybe adding to congestion as well as reducing transit trips.

Need a new paragraph

3.2.6 Land Use Strategies in the Washington Region

The relationship of land use and transportation often have an important influence on a person's willingness to commute by transit, ridesharing, bicycling, or walking; modes other than driving alone. The TPB is undertaking projects that consider the relationship of land use and transportation, all of which are important components of the CMP. Concentrating activities near transportation facilities helps reduce the number and length of vehicle trips necessary by residents and workers. More trips can be made by walking. Densities can be sufficient to make provision of transit services cost effective.

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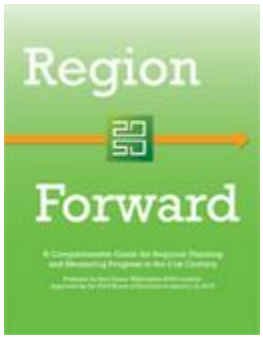
[37] Adapted from Wikipedia, "Carsharing", http://en.wikipedia.org/wiki/Carsharing.
[38] http://ddotdish.com/2013/11/25/parking-in-district-now-easier-for-carshare-users/
[39] http://www.commuterpage.com/pages/transportation-options/carsharing/ (Accessed April 30, 2016,)
[40], "TCRP J-11/Task 21 Shared Mobility and the Transformation of Public Transit Research Analysis." Prepared for American Public Transportation Association and Submitted to the National Academies Transportation Research Board. March 2016. (https://www.apta.com/resources/reportsandpublications/Documents/APTA-Shared-Mobility.pdf)

3.2.6.1 Cooperative Forecasting

TPB coordinates with the regional Cooperative Forecasting process at COG. Cooperative forecasting is a regional process that provides forecasts for demographic information that considers the potential impacts of future transportation facilities. The forecasts are based on national economic trends, local demographic factors, and are closely coordinated with regional travel forecasts.

Local jurisdictions develop independent projections of population, households, and employment based on pipeline development, market conditions, land use plans and zoning, and planned transportation improvements. These local forecasts are also compared and coordinated at the regional level to ensure compatibility. If there is a major change in planned transportation facilities (such as an addition or removal of a planned major facility) the cooperative forecasts are updated to reflect this change. Overall, Metropolitan Washington has strong, well-established processes to ensure transportation planning and land use planning are well-coordinated.

3.2.6.2 Region Forward and Regional Activity Centers



Region Forward is a vision for a more accessible, sustainable, prosperous, and livable National Capital Region. It was developed by the Greater Washington 2050 Coalition, a group of public, private, and civic leaders created by the Metropolitan Washington Council of Governments in 2008 to help the region meet future challenges like accommodating two million more people by 2050, maintaining aging infrastructure, growing more sustainably, and including all residents in future prosperity.
The Region Forward Compact seeks effective coordination of land use and transportation planning resulting in an integration of land use, transportation, environmental, and energy decisions. Specifically in the transportation sector, Region Forward:

- Seeks a broad range of public and private transportation choices for our Region which maximizes accessibility and affordability to everyone and minimizes reliance upon single occupancy use of the automobile.
- Seeks a transportation system that maximizes community connectivity and walkability, and minimizes ecological harm to the Region and world beyond.[41]

Regional Activity Centers help coordinate transportation and land use planning in specific areas in the Washington region experiencing and anticipating growth. Focusing growth in Centers is important to congestion management, where transportation options for those who live and work there can be provided. The concentration of activities and location near transportation facilities help reduce vehicle trips, as more trips can be made by walking. Transit services also become more cost effective.

e first map of Regional Activity Centers was created in 1999, and since that time it has been updated several times, based upon current local comprehensive plans and zoning. The most recent map of Activity Centers was developed by the Region Forward Coalition with the COG Planning Directions Technical Advisory Committee, was adopted by the COG Board in January 2013.[42] The development

[41] http://www.regionforward.org/compact
[42] Regional Activity Centers Map, January 2013
http://www.mwcog.org/uploads/pub-documents/oV5cXVc20130813171550.pdf

of the 2013 map and used more targeted and specific criteria than in previous version (2007) to designate 141 Activity Centers (Figure 65). The criteria are primarily based on Region Forward.[43]

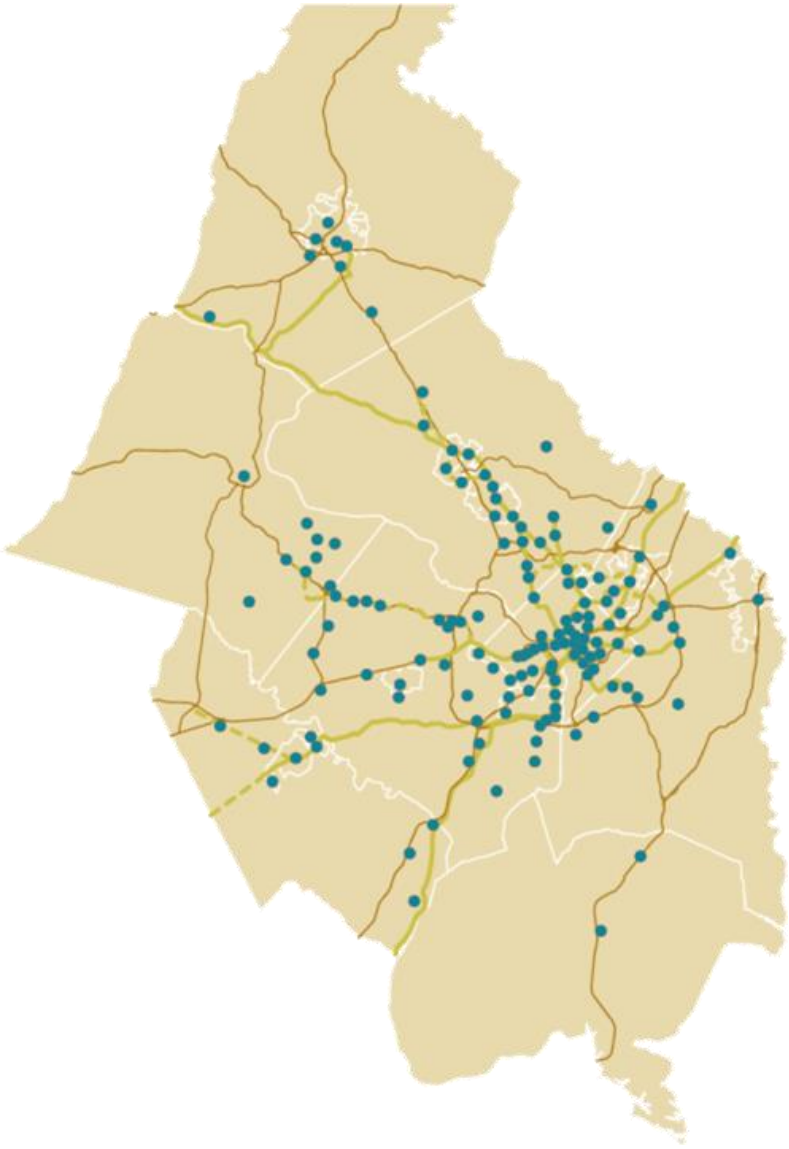
The Metropolitan Washington Council of Governments (COG) *Board of Directors* and the *Region Forward* Coalition adopted a joint focus on Economic Competitiveness for policy makers, planners and business leaders to collectively assess the current economic state and potential of the region. The *State of the Region: Economic Competitiveness Report* builds upon the work of *Region Forward* and subsequent COG reports to benchmark regional performance, The *State of the Region* report examines the region's economic competitiveness through an assessment of cross-cutting targets and indicators that address our shared economic climate, built infrastructure, human infrastructure, and quality of life. These indicators correspond closely with the four pillars outlined in *Region Forward* that focused on Prosperity, Accessibility, Sustainability, and Livability.[44]

COG's Round 8.4 Cooperative Forecasts indicate that between 2010 and 2040, 75.9% of employment growth, 56.8% of population growth, and 61.9% of household growth projected in the region will occur in Activity Centers.

In-depth surveys of household travel behavior conducted by the Transportation Planning Board in strategically-chosen areas around the Washington region will help planners and local officials better understand travel patterns in Activity Centers and neighborhoods.

Figure 1: 2013 Regional Activity Center Map

[43] http://www.regionforward.org/activity-centers-where-metropolitan-washington-is-growing
[44] https://www.mwcog.org/uploads/pub-documents/oF5aX1Y20160120082811.pdf



3.2.6.3 Transportation-Land Use Connection (TLC) Program

The Transportation Planning Board's (TPB) Transportation/Land Use Connections (TLC) program helps local jurisdictions work through the challenges of integrating transportation and land use planning to create vibrant communities. TLC is designed to support local planning and design projects as well as share success stories and proven tools with governments and agencies across the region.
Since 2007, the TPB has worked with every jurisdiction in the National Capital Region through the three components of the TLC Program: TLC Technical Assistance, the Peer Exchange Network (TLC PeerX), and the Transportation Alternatives Set Aside (TA Set Aside).
The TLC program allows for flexibility to study a wide variety of transportation – land use issues. Some projects are more demand management focused, focusing on pedestrian improvements, growth management, and transit-oriented development. Other projects address operational issues, including pedestrian safety improvements and roadway design. The goals among each may be different, but each project is applicable to congestion management.

3.2.6.4 Local Jurisdictional Land Use Planning Activities

Following are some of the major examples of activities going on at the local level that are important to congestion management. Activities range from having a strong comprehensive plan that guides local development, to the implementation of projects that include transportation options and pedestrian and bicycle facilities. Examples of local jurisdictional planning activities (please note: this is not a comprehensive list) include:

- Rockville's Pike Neighborhood Plan[45]
- Dale City, Virginia: Furthering the Vision of a Planned Community[46]
- Charles County Comprehensive Plan[47]
- New Zoning Code for the District of Columbia[48]

3.3 Operational Management Strategies

3.3.1 High-Occupancy Vehicle (HOV) Facilities

3.3.1.1 Overview

High Occupancy Vehicle (HOV) lanes are defined as roadways or roadway segments that are restricted to use by vehicles (cars, buses, vanpools) carrying the driver and one or more additional passengers.

HOV facilities offer several advantages over conventional lanes and roads. They increase the number of persons per motor vehicle using a highway over conventional (non-HOV) roadways, they preserve the person-moving capacity of a lane or roadway as demands for transportation capacity increase, and enhance bus transit operations. All of these advantages are important to effectively managing the operations of existing and new capacity on roadways.

However, HOV facilities can also be considered demand management strategies as well, providing predictable travel times even during peak periods of high demand for highway capacity. HOV lanes can help influence travelers' behavior and provide them with additional choices of how, or if, to travel a certain route.

Currently there are five HOV facilities in the Washington region on highways functionally classified as freeways:

- I-66 in the Northern Virginia counties of Prince William, Fairfax, and Arlington (this HOV system includes a section of the Dulles Connector in McLean, connecting to VA 267's HOV lanes – see below);

- Virginia Route 267 (Dulles Toll Road), where operation of concurrent-flow HOV lanes began in December 1998, connecting to I-66 via the Dulles Connector; and,

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[45] http://www.rockvillemd.gov/index.aspx?nid=206
[46] http://www.pwcgov.org/government/dept/planning/Pages/DaleCitySDAT.aspx
[47] http://www.charlescountyplan.org/
[48] http://planning.dc.gov/sites/default/files/dc/sites/op/release_content/attachments/ZRR%20Featured%20News%20Press%20Release_0.pdf

- I-95/I-395 (Shirley Highway) in the Northern Virginia counties of Prince William, Fairfax, and Arlington, and the City of Alexandria,

- I-270 and the I-270 spur in Montgomery County, Maryland;

- U.S. 50 (John Hanson Highway) in Prince George's County, Maryland.

COG/TPB staff typically studies the performance of HOV facilities every three or four years during the AM and PM peak periods. The most recent data collected and analyzed along these five HOV corridors was in Spring 2010 and the results can be found in the *2014 Performance of Regional High Occupancy Vehicle Facilities on Freeways in the Washington Region*[49]. Major findings from that report are discussed in Section 2.6.2.
Following is a breakdown of each HOV facility in detail with statistics provided from the aforementioned HOV performance report.

3.3.1.2 I-66 (Custis Memorial Parkway)

Interstate-66 was opened to traffic between the Capital Beltway (I-495) and Rosslyn, in Arlington County, in 1982. Initially the facility was restricted to HOV-4 traffic, meaning four occupants per vehicle. This was lowered to HOV-3 in late 1983 and to HOV-2 in March 1995. During the 1990s, I-66 outside the Beltway was expanded to include a concurrent-flow HOV lane to Virginia Route 234 (Business) in Prince William County just north of Manassas.

The I-66 HOV corridor consists of two distinct sections. One section is between the Capital Beltway (I-495) and Rosslyn. This segment of I-66 is restricted to HOV use only during the peak commute period of the peak direction, due to the large amount of traffic traveling inbound from Northern Virginia in the morning, and outbound from the District of Columbia in the evening. The other section, between Virginia Route 234 (Business) near Manassas and the Capital Beltway, is a concurrent-flow lane HOV facility. The entire HOV corridor is about 27 miles in length, about 9 miles inside the Beltway and 18 miles outside the Beltway.

I-66 is a key commuting corridor, as it connects the District of Columbia with the suburbs of Virginia and beyond. Direct access to employment centers in Washington, D.C. is provided via the Theodore Roosevelt Bridge over the Potomac River. Along the I-66 corridor there are also several Metrorail stations that many commuters drive to everyday. Some of these stations contain Park-and-Ride facilities that allow commuters to drive and connect to other modes, such as rail or bus.

There are changes planed for HOV operations on I-66 which are included in the 2016 CLRP. Inside the Beltway, in 2017, all lanes will become HOT-2 in the peak commute period of the peak direction. In 2020, outside the Beltway, the HOV-2 requirement will increase to HOV-3. In 2021, the new express toll lanes outside the Beltway are scheduled to open. Those lanes will be HOT-3 in both directions all day and I-66 inside the Beltway will become HOT-3 in both directions during the peak periods.

3.3.1.3 I-95/I-395 (Shirley Highway)

The Shirley Highway Corridor is one of the two corridors that provide direct access to the employment centers (the other is I-66). Therefore, understanding congestion on these corridors is crucial.

[49] *2014 Performance of Regional High Occupancy Vehicle Facilities on Freeways in the Washington Region*, May 22, 2015. https://www.mwcog.org/uploads/committee-documents/ZF1WV1tc20150526151650.pdf

The HOV/express toll lanes lanes in this corridor are entirely barrier-separated, and reversible, so they accommodate heavy AM peak period northbound traffic and operate southbound in the P.M. peak period. The section inside the Beltway is HOV-3. Outside the Beltway, the HOV lanes have been expanded and converted into express toll lanes from the Prince William County Parkway to Edsall Road. (see Section 3.3.2)

Changes to I-95/I-395 are included in the 2016 CLRP. In 2019, the section of I-395 that is currently HOV-3 will convert to HOT-3. At the southern end of I-95, the extension of the express toll lanes to south of Garrisonville Road are expected to open in 2018 and the extension to VA-17 in Spotsylvania County is expected to open by 2025.

The corridor is also served by the Virginia Railway Express (VRE) Fredericksburg Line. The Metrorail Blue Line terminates in the corridor at Franconia-Springfield. Numerous bus lines serve the corridor, including Metrobus, the City of Alexandria's DASH, Fairfax Connector, PRTC OmniRide and private motor coach companies serving communities in Stafford and Spotsylvania Counties and the City of Fredericksburg.

3.3.1.4 VA 267 (Dulles Toll Road)

Concurrent flow HOV lanes operate along this corridor from a point between Sully Road (VA 28) and Centreville Road (VA 657) to just west of Leesburg Pike (VA 7). There are no HOV lanes through the interchanges at VA 7, the main toll plaza, Spring Hill Road (VA684), I-495 and VA 123. HOV restrictions apply to all lanes of the Dulles Connector road from east of VA 123 to I-66. Metro's Silver Line operates in the median of the Dulles Access Road. Fairfax Connector provides most transit bus service in the corridor, with the Loudoun County Commuter Express providing commuter bus service from Loudoun County to the Metro Core area (including stops in Rosslyn, Arlington County and downtown Washington, D.C.).WMATA operates the route 5A Metrobus service between Washington Dulles International Airport and the L'Enfant Plaza Metrorail station, with intermediate stops at the Herndon/Monroe Park and Ride, and the Rosslyn Metrorail station.

The HOV lanes require at least two persons per vehicle and the requirement is from 6:30A.M. to 9:00 A.M. and from 4:00 P.M. to 6:30 P. M.

3.3.1.5 I-270 HOV Facilities

In the southbound (A.M. peak) direction, the HOV concurrent-flow lane runs from I-370 near Gaithersburg south to the Rockville Pike/Capital Beltway interchange. There is also a concurrent flow HOV lane along the southbound lanes of the I-270 Spur. Together, the A.M. peak-flow direction lanes total about 11 miles in length. The Spur is just less than 2 miles long. In the northbound (P.M. peak) direction, concurrent-flow HOV lanes exist along the entire northbound I-270 Spur, and along I-270 from its southern terminus at I-495/Md. 355 to I-370 (the same sections of the corridor having HOV lanes southbound). Additionally, there are about 7.5 miles of HOV lane between I-370 and Maryland 121 near Clarksburg.

The Metro Red Line serves the I-270 corridor from Shady Grove (I-370), continues south to Bethesda, and on to the downtown area of the District of Columbia. The Mass Transit Administration's (MTA) MARC Brunswick Line also serves several stops in this corridor, and continues south to Silver Spring and on to Union Station in the District of Columbia. Montgomery County Ride On serves areas in the corridor north of I-370, and MTA coach service (between Hagerstown, Frederick and Shady Grove) use

the HOV lanes. Express Metrobus service operates on the HOV lanes in the corridor between Bethesda and Gaithersburg.

3.3.1.6 US 50 HOV Facilities

Concurrent-flow HOV lanes operate in the U.S. 50 (John Hanson Highway) Corridor from just west of the Md. 704 Martin Luther King Highway interchange to east of the U.S. 301/Md. 3 interchange in Bowie. Unlike all other HOV lanes in the region, these lanes are HOV-2 restricted at all times (24 hours, 7 days) in both directions.

Buses operated the Washington Metropolitan Area Transit Authority (WMATA) and the Maryland Transit Administration (MTA) run on the U.S. 50 HOV lanes. To the east, the buses serve the City of Bowie in Prince George's County, and the Annapolis and Crofton areas of Anne Arundel County. All WMATA buses terminate at the New Carrollton rail station. Some MTA buses serve the downtown area of the District of Columbia, others terminate at New Carrollton.

3.3.2 VARIABLY PRICED LANES/SYSTEMS

Variably Priced Lanes (VPLs), a demand management strategy, is one type of managed lanes where the pricing of roadways to helps reduce congestion and generates revenue for transportation projects. VPLs are an effective way to provide alternatives to travelers willing to pay for travel time reliability. There are several examples of managed lanes in the United States including SR-91 in Orange, California; I-95 in Miami, FL; and I-394 and I-35W in Minneapolis.

There are currently three VPL facilities in operation in the region.. All of these facilities are designed without toll booths. Drivers are required to have an E-ZPass transponder.

- *The Intercounty Connector (MD 200)* – a 6-lane, 18-mile east-west highway in Montgomery County and Prince George's County Maryland that will run between I-270/I-370 and I-95/US 1. The majority of the facility, from I-270/I-370 to I-95 opened in November 2011. The final segment from I-95 to US 1 opened on November 9, 2014. Toll rates vary by time of day. The toll rate for two-axle vehicles in the peak period ranges from $0.22-$0.35 per mile, off-peak from $0.17-$0.30 per mile, and overnight from $0.07-$0.30 per mile.[50] MTA operates four bus routes on the ICC: Gaithersburg to BWI, Gaithersburg to Fort Meade, Columbia to Bethesda, and Frederick to College Park.[51]

- *495 Express Lanes* – Fourteen miles of new high-occupancy toll (HOT) lanes (two in each direction) were constructed on I-495 between the Springfield Interchange and just north of the Dulles Toll Road. The lanes, operating under a public-private partnership between VDOT and Transurban (USA) Development, Inc., opened on November 17, 2012. The express lanes use dynamic pricing, updated approximately every 15 minutes, to ensure that travel remains free-flowing. Vehicles carrying two or fewer people can travel in the lanes if they pay the toll. Buses, carpools and vanpools with three or more people, and motorcycles can ride in the lanes for free. The 495 Express Lanes offer HOV-3 connections with I-95/395, I-66 and the Dulles Toll Road for the first time.

[50] http://www.mdta.maryland.gov/ICC/Toll_Rates.html Accessed April 30, 2016
[51] http://mta.maryland.gov/commuter-bus/ Accessed April 30, 2016

According to the 495 and 95 Express Lanes Usage Update for July 2015[52], there were 42,000 average workday trips in the June 2015 quarter, up from 35,000 in the June 2014 quarter, and 29,000 in the June 2013 quarter. The average dynamic toll charged during that quarter was $3.92. The average trip length was 5.6 miles. HOV-3 trips and exempt vehicles make up approximately 13% of all traffic..

There were approximately 21,000 workday bus trips during the quarter. Omniride's Tysons Express from Woodbridge to Tysons Corner[53] and Fairfax Connector express bus service to Tysons from Lorton, Springfield, and Burke take advantage of the express lanes.[54].

- *95 Express Lanes (Northern Virginia)* – the 95 Express Lanes opened on December 14, 2014 creating approximately 29 miles of Express Lanes on I-95.[55] This project added capacity to the existing HOV Lanes from the Prince William Parkway to the vicinity of Edsall Road; improve the existing two HOV lanes for six miles from Route 234 to the Prince William Parkway. An eight-mile reversible two-lane extension of the existing HOV lanes from Dumfries to Garrisonville Road in Stafford County will help to alleviate the worst traffic bottleneck in the region.[56]Vehicles carrying two people would have a choice to ride in the HOT lanes for a toll or travel in the regular lanes for free. According to the 495 and 95 Express Lanes Usage Update for July 2015[57], the 95 Express Lanes had 45,000 average workday trips in the quarter ending in June 2015. The average dynamic toll charged was $5.48. The average trip length was 12.5 miles. HOV-3 trips and exempt vehicles make up approximately 32% of all traffic.
-
- I-66 Express Lanes (*Northern Virginia*) – I-66 inside the beltway which used to be a HOV 2+ facility during peak hours was converted to an express facility in late 2017. The hours of operation are 5:30 AM to 9:30 AM eastbound during the am peak period and 3 PM to 7 PM westbound during the pm peak period. To drive the facility all vehicles must have an EZ pass or EZpass flex which will enable 2+HOV drivers to use the facility for free. Tolls are dynamic (variable) and are adjusted every 30 minutes to ensure vehicles can travel at free flow speed (50 mph+) at all times. The exemptions for travelers going to the airport and clean fuel license plates have been eliminated.

The TPB has had active interest in VPLs since June 2003 when the TPB, together with the Federal Highway Administration and the Maryland, Virginia, and District Department of Transportation, sponsored a successful one day conference on value pricing in the Washington region. After the conference, in Fall 2003, the TPB created a Task Force on Value Pricing to further examine and consider the subject. Under a grant from the Federal Highway Administration's Value Pricing Program, the TPB Value Pricing Task Force evaluated a regional network of variably priced lanes in the region producing a final report in February 2008.[58] The findings of the VPL study were used in the CLRP

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[52] Transurban (USA) Operations, Inc. *495 and 95 Express Lanes Usage Update- July 2015.* https://www.expresslanes.com/uploads/1000/878-495_and_95_Express_Lanes_Usage_Update_July_2015_FINAL.pdf

[53] http://www.prtctransit.org/commuter-bus/schedules/tysonscorner-am.html

[54] https://www.expresslanes.com/ride-the-bus. Accessed April 30, 2016

[55] https://www.washingtonpost.com/local/trafficandcommuting/whats-hot-whats-not-a-users-guide-to-virginias-new-95-express-lanes/2014/12/13/e0b996f4-7afb-11e4-9a27-6fdbc612bff8_story.html

[56] http://www.vamegaprojects.com/about-megaprojects/i-95-hov-hot-lanes/ Accessed April 30, 2016.

[57] https://www.expresslanes.com/uploads/1000/878-495_and_95_Express_Lanes_Usage_Update_July_2015_FINAL.pdf

[58] Evaluating a Network of Variably Priced Lanes for the Washington Metropolitan Region, National Capital Region Transportation Planning Board, February 2008.

Aspirations Scenario Study and the newly adopted Regional Transportation Priorities Plan which are discussed in Chapter 5.

3.3.3 TRAFFIC MANAGEMENT

The topic of Traffic Management, including Incident Management and Intelligent Transportation Systems (ITS) is considered under the Systems Performance , Operations, and Technology Planning are all handled by the SPOTS Subcommittee.. MOITS advises the TPB on traffic management matters and provides a regional forum for coordination among TPB member agencies and other stakeholders on these topics.

Investments in operations-oriented strategies have time and again shown good benefit-cost ratios and best enable transportation agencies (for both highways and transit) to provide effective incident management and good customer service, through operations centers and staffs, motorist/safety service patrols, traffic signal optimization, and supporting technologies. Particularly, intersection improvements (signalization timing / geometrics) can provide cost efficient congestion reduction. Also, the Metropolitan Transportation Operations Coordination (MATOC) program, comprising DDOT, MDOT, VDOT, and WMATA, is a regional program to enhance the availability of real-time transportation information and strengthen coordination among transportation agencies.

3.3.3.1 Active Traffic Management (ATM)

As defined by FHWA, active traffic management is the "ability to dynamically manage recurrent and non-recurrent congestion based on prevailing and predicted traffic conditions." [59]

- VDOT's I-66 Active Traffic Management Project from the District of Columbia to Gainsville in Prince William County was brought online on September 16, 2015.[60] ATM components in the corridor will include expanded use of shoulder lanes, new lane control signals, expanded camera and dynamic message sign coverage, and upgrades to the ramp metering system.

- Montgomery County has an ATM system which includes strategies such a vehicle detection, video and aerial monitoring, and information outreach including broadcast media, internet,variable message signs, and Travelers Advisory Radio System (TARS). Future strategies will include variable speed limit signs, monitoring parking and weather/pavement sensors, and in-vehicle paging services.[61]
- In July 2012, VDOT issued an RFP to "operate, integrate, and innovate the state's Transportation Operations Centers (TOCs)." [62] One of the proposed outcomes of the project is to develop, implement, and operate a new state-wide ATM system platform across the five TOCs. The contract was award to Serco, Inc. in May 2013.

3.3.3.2 Incident Management

According to the Federal Highway Administration, an estimated 50% of congestion is associated with incidents such as crashes, disabled vehicles, and traffic associated with special events. If an incident disrupts traffic, it is important for congestion that normal flow resumes quickly.

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[59] http://ops.fhwa.dot.gov/atdm/approaches/atm.htm (Accessed June 7, 2016)
[60] http://www.virginiadot.org/newsroom/northern_virginia/2015/i-66_active_traffic_management85954.asp (accessed April 30, 2016)
[61] http://www.montgomerycountymd.gov/DOT-TMC/ATMS/gettmc.html (Accessed April 30, 2016)
[62] http://www.virginiadot.org/business/transportation_operations_centers.asp (Accessed April 30, 2016)

Many successful incident management activities are part of the robust activities undertaken by the Washington region's transportation agencies. 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. All three focus on getting timely word out to the media and public on incidents. Local-level agencies also play an important role in transportation management, particular on local roads and traffic signal optimization.

Specific state-wide and regional incident management strategies include:

- ***Imaging / video for traffic monitoring and detection*** – help detect incidents and allow emergency vehicles to arrive quickly. Also helps travelers negotiate around incidents.
    - State and local DOTs have cameras for traffic monitoring and detection throughout the region. The Regional Integrated Transportation Information System (RITIS) provides a platform for participating agencies to share realtime data feeds and other pertinent information related to realtime situational awareness and incident management.[63]
- ***Service patrols*** – These specially equipped motor vehicles and trained staff help in clearing incidents off a roadway and navigating traffic safely around an incident.
    - MDOT/CHART is now providing 24/7 safety patrols for the Washington region.
    - VDOT and DDOT also provide service patrols
    - Montgomery County became the region's first local jurisdiction to deploy patrols in 2006, concentrating on major arterials rather than freeways.

- ***Road Weather Management*** – Can take the forms of information dissemination, response and treatment, monitoring, prediction, and traffic control.
    - All three state DOTs implement road weather management systems that disseminate information, treat roadways, and monitor conditions, especially during winter snow and ice events.

    .
- ***Traffic Management Centers (TMCs)*** – These centers collect and analyze traffic data, then disseminate data to the public. Data collection includes CCTVs, cameras, and detectors.
    - All three state DOTs have TMCs:
        - *VDOT's McConnell Public Safety Transportation Operation Center (MPSTOC)* operates Northern Region Transportation Operations Center (TOC) and Signal System. The TOC monitors traffic and incidents by using cameras and other information-gathering mechanisms to better manage day-to-day traffic flow and large incidents.
        - *DDOT's Transportation Management Center* gathers and disseminates information to the public using a network of cameras and other devices.
        - *MDOT's Coordinated Highway Action Response Team (CHART)* collects traffic data, disseminates information to the public, and provides emergency motorist assistance.

- ***Curve Speed Warning Systems*** - use roadside detectors and electronic warning signs to warn drivers, typically those in commercial trucks and other heavy vehicles, of potentially dangerous speeds in approach to curves on highways, with the intention of preventing incidents.
    - Curve speed warning systems have been used on the Capital Beltway.

[63] http://i95coalition.org/projects/regional-integrated-transportation-information-system-ritis/

- ***Work zone management*** - uses traffic workers, signs, and temporary road blockers to direct and control traffic during construction activities.
    - All three state DOTs have work zone management programs to temporary implement traffic management and direct traffic. The goal is to reduce incidents by controlling the flow, speed, and direction of traffic.

- ***Automated truck rollover systems*** - detectors deployed on ramps to warn truck drivers if they are about to exceed their rollover threshold, thus helping to reduce incidents.
    - Automated truck rollover systems, similar to the curve speed warning systems, were implemented at the same locations on the Capital Beltway in Virginia and Maryland. This was in response to a high number of truck rollovers on the Beltway in the 1980's.

Studies have shown the impact incident management activities have on reducing congestion, in particular reducing duration of incidents and reducing chances for secondary incidents. An example of this type of study is the yearly analysis of impacts of the Coordinated Highway Action Response Team (CHART) on incident management in Maryland. The focus of the report is to gauge effectiveness of CHART's availability to detect and manage incidents on major freeways and highways.

The *Performance Evaluation and Benefit Analysis for CHART in Year 2012*[64] includes statistics and analysis such as:

- Distribution of incidents an disabled vehicles
    - By day and time
    - By road and location
    - By lane blockage type
    - By blockage duration
    - By nature of incident (accident, disabled vehicle, etc.)
- Comparison of current year's data with that of previous years
- Benefits from CHART's incident management
    - Assistance to drivers
    - Potential reduction in secondary incidents
    - Estimated benefits due to efficient removal of stationary vehicles
    - Direct benefits to highway users

Analysis and studies such as those conducted by CHART indicate that incident management activities do have a positive impact on congestion. Each minute of reduced duration of incidents, for example, reduces the chances of secondary incidents and has a concomitant reduction in the severity and duration of non-recurring congestion. It is estimated that 218 potential secondary incidents were avoided in 2012 due to shortened incident duration. The 2012 analysis of CHART shows the decrease in incident duration with SHA patrol:

- Duration averaged 22 minutes with SHA patrol, compared to 29 minutes without.
- For incidents blocking the shoulder only, duration averaged 18 minutes with SHA patrol, compared to 28 minutes without.

[64] Chang, G.L & M. Raqib. Performance Evaluation and Benefit Analysis for CHART in Year 2012 (Final Report). http://chartinput.umd.edu/reports/CHART_2012_final.pdf

- For incidents blocking one lane, duration averaged 20 minutes with SHA patrol, compared to 26 minutes without.
- For incidents blocking two lanes, duration averaged 33 minutes with SHA patrol, compared to 40 minutes without.
- For incidents blocking three lanes, duration averaged 43 minutes with SHA patrol, compared to 46 minutes without.

It was estimated that in 2012, 429 potential lane-changing collisions were avoided due to the CHART program. Even a relatively simple activity such as a service patrol assisting a motorist with a flat tire, or one who is out of fuel, might prevent a congestion-inducing crash. Continuing enhancement and investment of incident management activities will support congestion management.

Traffic Incident Management Enhancement (TIME) Task Force

On January 10, 2018 the COG Board of Directors created the TIME Task Force to assess traffic incident management in the National Capital Region and recommend enhancements to regional practice and operations.

3.3.3.3 Traffic Signal Operations

Traffic Signal Optimization

Under the guidance of the TPB's Traffic Signals Subcommittee, TPB staff conducted a survey of signal timing throughout the region during April/May 2013. There are 21 different agencies that have ownership and/or maintenance responsibilities for the approximately 5,500 signals on public roads in the region. The survey found that an estimated 76% of the eligible traffic signals had been retimed within the past three years, which is a generally accepted guideline. The signals in the region use a variety of retiming methods including computer optimization, engineering judgment, and active management.[65]

DDOT has a comprehensive 5-year plan underway to improve the flow of traffic in the region, including signal timing, and impacts all 1600 traffic signals in the District of Columbia.[66] The project was completed in 2016 and funding secured to continue another round of signal timing optimization. In Anacostia, one of the completed areas, DDOT reports a 13% network-wide travel time savings over all peak periods, a 34% reduction in delays, and a 23% reduction in stops. In the downtown area, DDOT reports travel time savings for motorized vehicles during all periods, and reduced stopping for bicycles in the Pennsylvania separated bike lanes.[67]

Advanced Traffic Signal Systems

Advanced Traffic Signal Systems are used for coordination of traffic signal operations in a jurisdiction, or between jurisdictions using detectors to monitor real-time traffic conditions. This is important to congestion, as it reduces delay and improves travel time. It can include active traffic signal management – where traffic signals are managed through a control center, where technicians adjust

[65] http://www.mwcog.org/uploads/committee-documents/al1ZXFpb20140212133426.pdf
[66] http://ddotdish.com/2013/10/08/signal-optimization-and-improving-traffic-flow-in-the-district/
[67] DDOT, District of Columbia Traffic Signal Timing Optimization Status Update, Presented to the TPB Traffic Signals Subcommittee, June 23 2015. http://www.mwcog.org/uploads/committee-documents/b1xfW19X20150910085448.pdf

the length of signal phases based on prevailing traffic conditions – or adaptive signal control – in which the controller automatically adjusts the timing of signals to accommodate changing traffic patterns.

- VDOT actively optimizes traffic signal timing plans and launched a signal/arterial traffic management control center located adjacent to the MPSTOC operating floor to proactively manage the arterial traffic.

- The City of Alexandria has implemented an adaptive traffic signal control system along Duke Street. The system can adapt to real-time traffic situations by changing cycle lengths as traffic flows change while keeping the corridor synchronized.

- Maryland SHA announced plans to introduce smart traffic signals (adaptive system) along a number of corridors in the region to reduce delays for more than 100,000 vehicles in the region. The routes are MD 5, US 301, MD 228 MD 202, and MD 108 in Charles, Prince George's and Montgomery County, Maryland.

Traffic Signal Timing

Traffic signal timing plans adjust traffic signals during an incident, during inclement weather, or to improve transit performance. The overall objective is to reduce backups at traffic signals and to increase the level of service.

3.3.3.4 Regional Operations Coordination

Metropolitan Area Transportation Operations Coordination (MATOC)

The Metropolitan Area Transportation Operations Coordination (MATOC) Program is a coordinated partnership between transportation agencies in D.C., Maryland, and Virginia that aims to improve safety and mobility in the region through information sharing, planning, and coordination. Current agencies include the District of Columbia, Maryland, and Virginia Departments of Transportation along with County and City transportation departments and transit providers like WMATA and other local providers. For example, a recent review of the MATOC program showed that coordination between the MATOC family of agencies during a bus crash on I-66 resulted in a savings of over $382,000 for area commuters. This savings was a result of decreased emissions, fuel consumption and lost time. [68]

A benefit-cost study of the MATOC program was undertaken and the results were based on three incidents that were handled by MATOC. The benefit-cost study looked at travelers "modified trips" - trips made at a later time, on another route, by another mode, or not made due to regionally significant incidents. Benefits were estimated from reduced delay, fuel consumption, emissions (including greenhouse gases), and secondary incidents. Three case studies were conducted, two for freeway incidents and one for arterial incident. The study found an overall benefit/cost ratio conservatively estimated at 10 to 1. A summary report of this study called the MATOC Benefit Cost Analysis dated June 2010 is available. MATOC also maintains a public use website called Traffic View which can be accessed at www.trafficview.org which uses the RITIS traffic information to inform the public about regional traffic incidents and roadway conditions.

[68] www.matoc.org

MATOC has undertaken several new initiatives. The Severe Weather Mobilization Coordination Effort, began during the winter of 2012-2013. This effort has led to "the development of consistent terminology to describe roadway and transit conditions throughout the region, protocols for sharing weather information from different agency-specific sources and detection systems, testing of coordinated messaging systems, and better ways to advise the overall regional winter storm decision-making process." [69] MATOC's Regional Construction and Work Zone Coordination effort was initiatedStudy, was activated in 2014 to develop a framework for regional coordination around major construction projects as well as regional work zone-related lane closures and special events. In the Spring of 2016, MATOC hosted its first Regional Traffic Incident Management (TIM) Conference in an effort to bring together its partner Departments of Transportation and area first responders to highlight, discuss, and demonstrate advancements in TIM best practices, technologies, and policies affecting agencies and jurisdictions in and around the National Capital Region. MATOC followed up with its June 2018 Regional Traffic Incident Management Tabletop Exercise to bring together its partner transportation agencies and first responders to evaluate and discuss communications and coordination efforts. The MATOC program is committed to hosting similar regional TIM related events in the future to support its member Departments of Transportation and their regional partners..

3.3.3.5 Intelligent Transportation Systems (ITS)

ITS strategies can be defined as electronic technologies and communication devices aimed at monitoring traffic flow, detecting incidents, and providing information to the public and emergency systems on what is happening on our roadways and transit communities. Much of what is done with ITS helps in reducing non-recurring and incident-related congestion.

- ***Electronic Payment Systems*** - These systems can make transit use more convenient by allowing a user to pay for bus, rail, park-and-ride lots, and other transit services with one card. Convenience an appealing factor, and helps increase transit ridership and transfers among different transit modes.
    - SmarTrip cards are used for rail and bus fares (both WMATA and local buses) and for WMATA parking facilities. WMATA discontinued use of paper farecards on March 6, 2016.[70]
    - The region's roadway toll agencies are part of the E-ZPass consortium electronic payment system. The ICC and the 495 and 95 Express Lanes are E-ZPass-only facilities (no toll booths).
    - TransIT (Frederick County) released phone app for payment of TransIT fares.[71].

- ***Freeway Ramp Metering*** - Traffic signals on freeway ramps that alternate between red and green to control the flow of vehicles entering the freeway. This prevents incidents that may occur from vehicles entering the freeway too quickly, and also prevents a backup of traffic on the on-ramp.
    - Ramp meters are used inside the Capital Beltway (I-495) in Virginia on I-66 and I-395.

[69] http://www.regionforward.org/improving-metro-dcs-transportation-coordination-preparedness-after-snowstorm-produced-nightmare-commutes
[70] http://www.wmata.com/fares/paperless.cfm
[71] https://frederickcountymd.gov/5906/Mobile-App

- ***Automated Enforcement (e.g. red light cameras)*** - Still or video cameras that monitor things such as speed, ramp metering, and the running of red lights, to name a few. They are important to preventing non-recurring and incident related congestion.
    - In the Washington region, the legal ability to deploy these systems is in place in the District of Columbia and Maryland, and pending in Virginia.

- ***Reversible Lanes*** - Traffic sensors and lane control signs reverse the flow of traffic and allow travel in the peak direction during rush hours. This is important to alleviating congestion that may occur in one direction during a peak hour. Examples of reversible lanes include Rock Creek Parkway in the District and Colesville Rd./US29 in Maryland

I-270 Innovative Congestion Management Project – The aim of the project is to safely move the most traffic furthest and fastest using innovative approaches within a fixed $100 million dollar budget. The project would contain both roadway improvements and innovative technology and techniques to achieve the goal.

3.3.3.6 Connected Vehicles

According to FHWA, connected vehicle research has the potential to transform travel by identifying threats and hazards on the roadway and communicating this information over wireless networks to give drivers alerts and warnings. This communication includes communications between vehicles, and communications between infrastructure or handheld devices and vehicles.[72]

VDOT has been active in connected vehicle planning for many years and has been the lead state for the Connected Vehicle Pooled Fund Study. VDOT's FY 2016 Business Plan calls for the development of a Statewide Connected Vehicle Program Plan to "maximize the safety and operational benefits of these emerging technologies." The expected outcomes are:

- A clear vision of the future state of connected vehicle technologies
- Impact of that vision on transportation in the Commonwealth
- Identification of strategies that VDOT will undertake to leverage connected vehicle technologies
- Improve readiness to address changes in the CV industry, such as proposed federal rulemaking and advances in private sector connected vehicle products and services. [73]

3.4 Integrative/Multi-Modal Strategies

3.4.1 Advanced Traveler Information Systems (ATIS)

ATIS are technology-based means of compiling and disseminating transportation systems information on a real-time or near-real-time basis prior to or during tripmaking. The prevalence of smartphones and other mobile internet-capable devices make real-time information more accessible to travelers.

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[72] http://ops.fhwa.dot.gov/travelinfo/infostructure/aboutinfo.htm (Accessed June 7, 2016)

[73] http://www.virginiadot.org/projects/resources/2016PlanningProgramming/6_VDOT's_Connected_Vehicle_Program_Plan.pdf
http://www.virginiadot.org/projects/resources/2016PlanningProgramming/6_VDOT's_Connected_Vehicle_Program_Plan.pdf

- Virginia operates under a statewide 511 system via telephone, internet (http://www.511virginia.org/), and mobile app.
- The District of Columbia makes traffic information, including live traffic cameras, traffic alerts, and street closures, available on the DDOT website.
- Maryland provides live traffic information on traffic and incidents via the CHART website the MD 511 Interactive Voice Response (IVR) System and Website.
- Dynamic Message Signs (DMS) are used throughout the region including permanently installed signs on freeways and portable signs used on both freeways and arterials.
- WMATA provides real-time transit information (both bus and rail) on the web and on informational screens in the Metrorail stations.
- Real-time bus information is available for many of the region's bus systems (including Montgomery, Arlington, and Prince George's Counties and the City of Fairfax).
- TPB is overseeing a TIGER project for Real Time Passenger Information (RTPI). There are 225 proposed locations for electrified signs at bus shelters in nine corridors throughout the region.
- The MATOC website has links to all three state's traffic information. In addition, there is a link provided to the Traffic View website (www.trafficview.org) which aggregates traveler information including incidents, traffic camera feeds, construction activity and schedules, and variable message sign information for the region.

3.4.2 Bus Priority Systems

Bus priority systems are sensors used to detect approaching transit vehicles and alter signal timings to improve transit performance. For example, some systems extend the duration of green signals for public transportation vehicles when necessary. This is important because improved transit performance, including more reliable arrival times for buses, makes public transit a more appealing option for travelers.

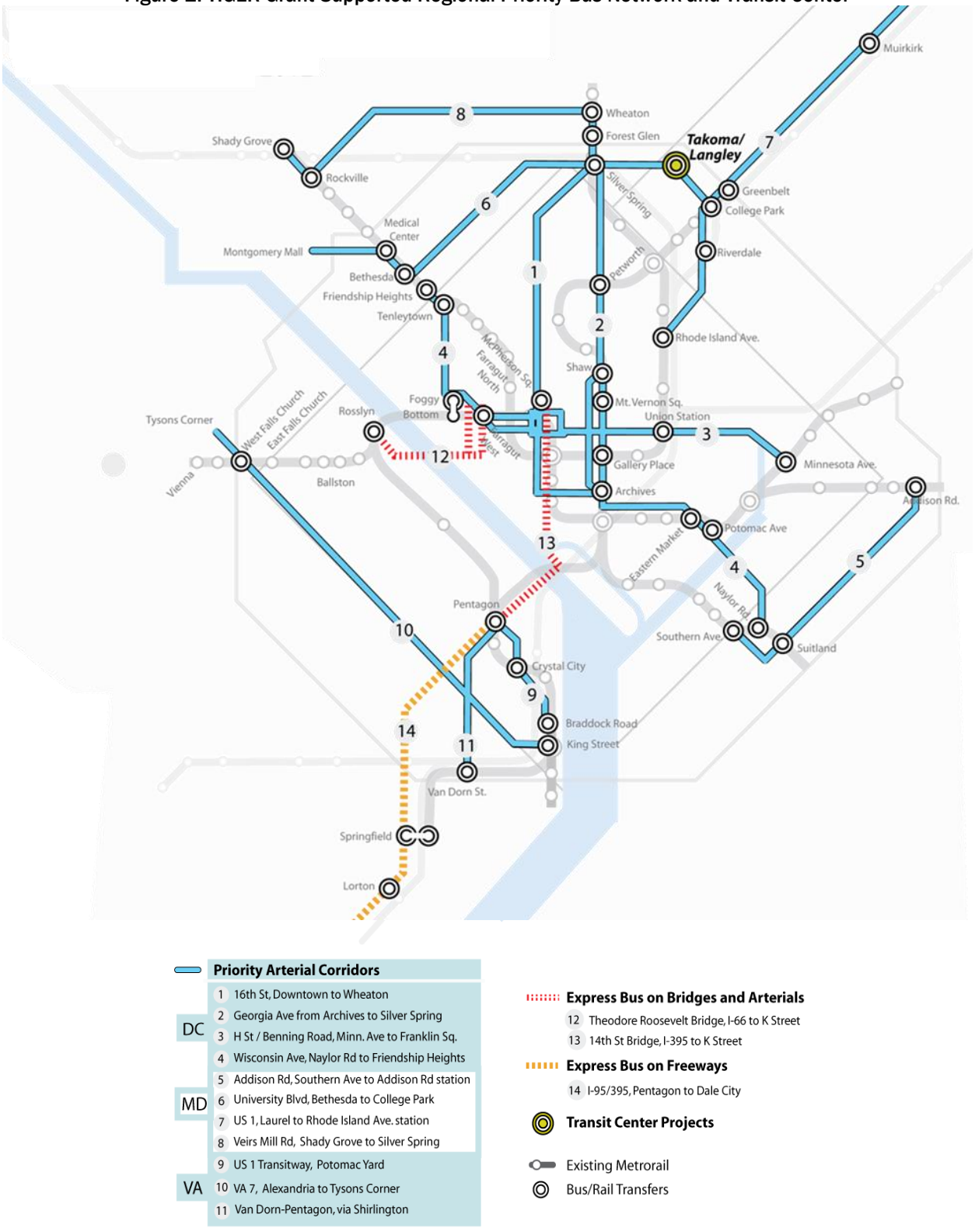
- Montgomery County has co-located traffic management and transit dispatch which enables adjustment of signals (by the centralized signal operations center) if deemed necessary for transit.

- The region, led by TPB, was awarded a $58 million federal Transportation Investment Generating Economic Recovery (TIGER) grant for developing a priority bus corridors network (Figure 66). A total of 13 priority bus corridors are funded in DC, Maryland and Virginia, and one transit center, Takoma/Langley Transit Center, is funded in Maryland. Bus priority improvements include running buses on dedicated lanes, adding queue jump lanes for buses, implementing transit signal priority, and improving bus stops. This regional priority bus network is anticipated to be complete in 2016.

- In September 2013, the TPB released an Assessment of the Feasibility of Bus on Shoulders (BOS) at Select Locations in the National Capital Region.[74] This report presented the findings of the Bus on Shoulder Task Force was formed in in July 2012 to "identify promising locations in the region to operate buses on the shoulders of highways." Three corridors, MD 5/US 301, I-270, and I-66 inside the Beltway, were selected for detailed study which included existing bus service, traffic congestion, and shoulder conditions. VDOT began a one-year pilot BOS operation on I-66 in March 2015.[75]

[74] https://www.mwcog.org/uploads/committee-documents/bV1aWlxd20130926085957.pdf
[75] *http://www.virginiadot.org/projects/northernvirginia/66_bos.asp*

Figure 2: TIGER Grant Supported Regional Priority Bus Network and Transit Center



3.4.3 Regional ITS Architecture

The TPB has developed a regional ITS architecture, the Metropolitan Washington Regional Intelligent Transportation Systems Architecture (MWRITSA)[76]. The Regional Architecture is intended to provide a regional ITS framework for the foreseeable future, to define and validate ITS operations of regional significance, and to address national and statewide conformity in accordance with federal law and guidance. The architecture aims to ensure knowledge of ITS operations across the region, encouraging appropriate systems integration and enhanced technical systems interoperability. In addition to describing the interrelationships among existing transportation technology systems, the MWRITSA can provide a starting point for identifying responsibility for ITS Projects and applicable standards. It can inform business cases for state and federal ITS investment in transportation improvement programs as well as other plans, programs, and projects. The three DOTs have worked collaboratively to bring consistency among their regional ITS architectures. The Regional Architecture is updated periodically to reflect changes in the region and is currently under revision.[77]

3.4.4 Integrated Corridor Management (ICM)

New technologies and concepts have been tested nationally or internationally to integrate operations to manage total corridor capacity including freeways, arterials, bus, rail, and parking systems. The purposes of the initiative include identifying innovative technologies to facilitate multi-modal local, regional, and national corridor travel, and identifying tools to provide information to travelers related to travel times and parking.

- VDOT's has an ICM project on the I-95 and US-1 corridor from the DC line to Fredericksburg. VDOT launched the first ICM initiative on the corridor in February 2014. The 511 website and mobile app now have a link for the I-95/395 corridor where users can see:
    - Current travel times in HOV Lanes versus general purpose lanes
    - Park-and-ride locations and number of spaces available
    - Real-time VRE travel information
    - PRTC bus schedules and stop locations
    - HOV lane open/closed status [78]

- VDOT received a grant in 2015 from FHWA to study ICM in Norther Virginia's East-West Corridor. As part of the 20-month project, a Concept of Operations and Deployment Plan will be developed. The project will include collaboration among partner agencies and engage stakeholders across the study area.[79]

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[76] The Metropolitan Washington Regional Intelligent Transportation Systems Architecture. http://www.mwcog.org/itsarch/Home.htm
[77] http://www.mwcog.org/itsarch/
[78] http://www.95expresslanes.com/uploads/1000/433-VDOT_LAUNCHES_NEW_NORTHERN_VIRGINIA_COMMUTER_TOOLS_ON_511.pdf
[79] McElwain, Amy, "Northern Virginia's Current Integrated Corridor Management Planning Effort for the East-West Travel Shed." Presentation to the TPB's Management, Operations, and Intelligent Transportation Systems Subcommittee, April 13, 2016.

3.4.5 Evaluating Significant Transportation Projects (Virginia)

In September 2013, VDOT and its partners initiated a study to evaluate and rate at least 25 significant transportation projects in Northern Virginia. This study, which was mandated by legislation passed by the Virginia General Assembly in 2012, requires the consideration of operations in capital program. More specifically, the projects will be evaluated based on the expected ability to reduce congestion and in prove regional mobility. [80]

3.4.6 Mobile Devices and Social Media

3.4.6.1 Mobile Devices

The increasing number of people with mobile internet-capable devices, such as smartphones and tablets, combined with the availability of real-time travel data, is changing the way travelers receive information and make decisions on their choice of mode, route, and/or departure time. Most travelers now carry a mobile device with maps and GPS allowing for information to be tailored to their location. DOTs, transit agencies, private transportation providers, and other third parties have developed mobile versions of websites and mobile applications (apps) to make it easier for travelers to receive information on their devices.

- Both Maryland 511 and Virginia 511 provide a mobile version of their website. Commuters can sign up to get email and text alerts about travel time and incident information on preferred routes.
- WMATA provides real-time rail arrivals on the mobile version of its website.
- Many bus operators make real-time arrival information and/or static schedules available on their mobile websites and/or make data available to third party websites and applications. NextBus is one of the most popular bus information apps.
- MARC provides real time incident and delay alerts through text, and email to commuters. The MARCTracker website provides live GPS train locations.
- Capital Bikeshare,carshare, (ZipCar, Car2Go, and Enterprise), and ridehailing (Uber, Lyft) companies have mobile apps which allow users to make travel decision on the spot.
- Traffic information, based on data sources such as INRIX, is available through a number of apps (INRIX, Google Maps, and WAZE being among some of the most popular. See Section 3.4.6.2 for more information about WAZE.)
- Wireless Emergency Alerts (WEA) are sent by authorized government alerting authorities. These alerts can contain information that is valuable to the traveling public such as extreme weather warnings and local emergencies requiring evacuation or other immediate action.[81]
- Commuter Connections released a mobile version of its website, a mobile app,[82] and is developing a dynamic ridesharing app.[83]

Safety while using the devices while traveling remains a concern; all three states have laws against distracted driving and texting while driving.

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[80] *Evaluation of Significant Transportation Projects in Northern Virginia Transportation District Fact Sheet* Fall 2013 http://www.virginiadot.org/projects/resources/NorthernVirginia/Significant_Projects_-_Fact_Sheet.pdf
[81] http://www.nws.noaa.gov/com/weatherreadynation/wea.html#. Accessed June 7, 2016.
[82] http://www.commuterconnections.org/wp-content/uploads/CommuterConnectionsLaunchesMobileApps.pdf
[83] https://www.mwcog.org/uploads/committee-documents/alxeWFxZ20160311091245.pdf

3.4.6.2 Social Media

The traveling public is now oriented toward the use of social media for many aspects of their lives. The social media landscape is constantly evolving and it is causing the transportation sector to rethink its model for providing information. Transportation agencies in the region have adopted social media as a means of sharing information with a large segment of the public. Instead of providing information only on a central website that the user has to visit, social media provides a way to deliver that information to users through a forum to which they already subscribe, such as Twitter which is one of the most popular social media sites for the transportation sector. In addition, social media can provide a means for agencies to receive information from users in order to better manage the system.

- MDOT, VDOT, and DDOT all use Twitter to share information.
- Local police departments user Twitter to provide preliminary information and updates on active incidents.
- WMATA uses four different Twitter accounts to share general information, Metrorail information, Metrobus information, and crime prevention tips. Supplemental two-way customer support is provided on the Metrorail and Metrobus feeds from 7 a.m. to 6 p.m.[84]
- WAZE[85] is a community-based traffic and navigation app. WAZE goes beyond other apps that provide traffic data by providing a crowdsourcing component. Users can passively contribute to providing traffic information by having the mobile app open while driving. They can also contribute by sharing information about incidents and other travel conditions.
    - DDOT joined WAZE's Connected Citizens program in 2015 which establishes a two-way partnership for data-sharing.[86]
- MATOC users its own Twitter account to provide updates on incidents. It follows other twitter feeds (including police departments, local jurisdictions, transit agencies, news organizations, etc.) and crowdsourcing websites like WAZE to obtain more timely and accurate information about incidents.

3.4.7 Traffic Management Activities Associated with Defense Base Closure and Realignment Commission (BRAC) Actions

3.4.7.1 Walter Reed

The Walter Reed National Military Medical Center (WRNMMC) is located at 8901 Rockville Pike in Bethesda, Montgomery County. The facility occupies most of the east side of Rockville Pike (MD 355) between Jones Bridge Road and Cedar Lane. Under the BRAC action, this facility represents the absorption of the former Walter Reed Army Medical Center, an Army facility located at 6900 Georgia Avenue, NW in the District of Columbia (now closed), into the Bethesda site previously called the National Naval Medical Center. The Uniformed Services University of Health Sciences (USUHS) is located on the WRNMMC site.

Employment at the site has increased from about 8,000 in 2008 to about 10,200 in 2012. According to the Walter Reed Web site, about 23% of employees "utilize environmentally-friendly transportation modes to come to work each day." A new pedestrian tunnel under Rockville Pike linking the site to the Medical Center stop on the Metrorail Red Line and new elevators from near the hospital entrance

[84] http://www.wmata.com/rider_tools/metro_service_status/connect_with_twitter.cfm (Accessed May 10, 2016).
[85] https://www.waze.com/about (Accessed May 10, 2016).
[86] http://ddot.dc.gov/release/ddot-joins-waze-connected-citizens-program

to the Metro platform are scheduled for completion by September 2017.[87] Additionally, the Maryland State Highway Administration and Montgomery County Department of Transportation are undertaking major intersection improvements at the intersections of Rockville Pike and Cedar Lane / West Cedar Lane (construction underway), Old Georgetown Road and West Cedar Lane (construction underway), and Connecticut Avenue (MD 185) at Jones Bridge Road (construction on the third phase is expected to begin in Spring 2018).[88] For years, these three intersections have consistently been among the most congested in the County. Smaller scale improvements are also being / have been implemented at other intersections along the roads adjacent to the site.

3.4.7.2 Mark Center

The Mark Center (also known as BRAC-133) is located at the southwest quadrant of the interchange of I-395 and Seminary Road in the City of Alexandria. Access to the site is via Mark Center Avenue, which intersects Seminary Road, and Mark Center Drive, which intersects North Beauregard Street. Approximately 6,400 jobs were moved to Mark Center. Adjacent is the Institute for Defense Analysis, which houses about 600 employees. A report with monthly traffic monitoring conducted between August 2011 and November 2013 was released in March 2014.[89]

A new transit bus station with five bus bays, which accommodates service from WMATA Metrobus, Alexandria DASH and private providers was built a short walk from the Mark Center. The Beauregard corridor was one of three corridors studies by the City for high-capacity transit service.[90] The Virginia Department of Transportation (VDOT) is building a new reversible ramp from the I-395 High Occupancy Vehicle (HOV) lanes to enable direct access from those lanes to Seminary Road during the morning peak commute period, and from Seminary Road to the HOV lanes in the afternoon commute period. These lanes are limited to HOV-3 (three-person car-pools, van-pools, buses and motorcycles) while in northbound operation from 6:00 AM to 9:00 AM and southbound from 3:30 PM to 6:00 PM. The ramp opened to traffic in January 2016.[91]

3.4.7.3 Fort Belvoir

Fort Belvoir is located along Richmond Highway (US 1) and I-95 in Fairfax County. It consists of two separate sites, the larger main post (located on the east and west sides of U.S. 1 south of Mount Vernon Highway (VA 235) and the smaller Fort Belvoir North area (the former Engineer Proving Ground), generally bounded by I-95, the Fairfax County Parkway (VA 286) and the neighborhoods just south of the Franconia-Springfield Parkway (VA 289). The National Geospatial Agency (NGA) is the primary tenant at Fort Belvoir North, while the main post hosts a number of Army functions.

In 2006, there were about 23,300 jobs at Fort Belvoir and Fort Belvoir North. As of 2011, there were about 36,400 jobs on the two sites (there will be additional off-base jobs which are not included in this total).

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[87] http://www.montgomerycountymd.gov/dot-dte/projects/355Underpass/index.html (Accessed June 6, 2016
[88] http://apps.roads.maryland.gov/WebProjectLifeCycle/ProjectSchedule.aspx?projectno=MO5932125 (12/23/2015 Status Update, Accessed June 6, 2016)
[89] http://www.vamegaprojects.com/tasks/sites/default/assets/File/pdf/BRAC/MarkCenter/Mark_Center_Traffic_Monitoring_Revised_Final_Report_032014.pdf
[90] Transitway Corridor Feasibility Study Corridor C (Van Dorn / Beauregard) Recommendation by High Capacity Transit Corridor Work Group https://www.alexandriava.gov/uploadedFiles/tes/info/2011-05-19_CWG%20Motion%20on%20Corridor%20C%284%29.pdf
[91] http://www.virginiadot.org/projects/northernvirginia/i-395_hov-transit_ramp.asp (Accessed June 6, 2016)

Transportation improvements in the area include:

- Completion of the final section of VA 286 between Newington and VA 289, including a new interchange on the west side of Fort Belvoir North at Barta Road
- A new ramp from the I-95 Express Lanes (HOV-3 restricted during peak commute times) to Heller Road on Fort Belvoir North
- Widening US 1 from four to six lanes from VA 611 to VA 235. The projects will also include the addition of left and right turn lanes at intersections and connecting roadways, and provision of a multi-use trail, pedestrian sidewalk, and on-road bicycle accommodations. Construction is scheduled to be completed in late 2016.[92]

3.5 Additional System Capacity

3.5.1 Documentation of Congestion Management for Additional System Capacity

Federal regulations state that any project proposing an increase in Single-Occupant Vehicle Capacity should show that congestion management strategies have been considered. The specific language from the Federal Rule states that Transportation Management Areas (TMAs) shall provide for:

"an appropriate analysis of reasonable (including multimodal) travel demand reduction and operational management strategies for the corridor in which a project that will result in a significant increase in SOVs is proposed to be advanced with Federal Funds. If the analysis demonstrates that travel demand reduction and operational management strategies cannot fully satisfy the need for additional capacity in the corridor, and additional SOV capacity is warranted, then the congestion management process shall identify all reasonable strategies to managed the SOV facility safely and effectively."

In the Washington region, the TPB is ensuring that all proposed SOV capacity increasing projects (except those which are exempt) show that congestion management strategies have been considered to effectively manage the additional capacity. This is being done with agencies completing a "CMP Documentation Form" when submitting a proposal for projects in the long-range plan and Transportation Improvement Program (TIP).

A sample CMP documentation form was developed to provide guidance to agencies completing these forms[93] (Appendix F). Agencies completing these forms are able to cite various ongoing strategies in the region, local jurisdiction, and corridor in the vicinity of their project.

3.5.2 Where Additional System Capacity Is Needed and How the Additional System Capacity Will be Managed Efficiently

The CLRP, updated regularly, identifies where major roadway capacity expansions are planned. The TPB, through the CLRP, asks that congestion management strategies be considered for these capacity increases. In the Washington region, all proposed SOV capacity increasing projects (except those which are exempt), show that congestion management strategies have been considered to effectively manage the additional capacity. These types of strategies could be of demand or operational

[92] http://rte1ftbelvoir.com/project-schedule/ (Accessed June 6, 2016)
[93] TPB, *Call for Projects for the 2013 CLRP and FY 2013-2018*, Approved on October 17, 2012. http://www.mwcog.org/clrp/resources/2013/Call_for_Projects.pdf

management, or both, as outlined in this report. Many of these strategies are considered before any capacity-increasing project is adopted.

The CLRP, through the CMP, strongly encourages consideration and implementation of strategies such as the following to manage both existing and future additional roadway capacity:

- Transportation Demand Management (TDM) strategies, such as Commuter Connections programs.
- Traffic Operational Improvements
- Public Transportation Improvements
- Intelligent Transportation Systems technologies
- Combinations of the above strategies.

Roadway capacity increases may be needed in specific locations for a number of reasons including bottleneck removal, safety improvements, economic development, and other reasons. Managing this capacity through the CMP is key.

3.6 Project-Related Congestion Management

In recent years, the Washington region has successfully implemented project-related congestion management for major construction projects. Strategies include providing incentives for commuters to give up driving alone and try transit, carpooling, vanpooling, and other alternatives, disseminating more information about construction projects and congestion, improving alternative routes, providing fire and rescue equipment and staff for emergency services along with additional police services, adding additional spaces to park-and-ride lots, providing additional shuttle bus services, etc.

Some successful examples of implementing project-related congestion management during construction include the Woodrow Wilson Bridge project, the I-95/I-495 Springfield Interchange project and the South Capitol Street project.

Ongoing major construction projects continue the practice of implementing project-related congestion management. Examples are DDOT 11th Street Bridge project and Northern Virginia Megaprojects.

11th Street Bridges Project

During the construction phases of the DDOT 11th Street Bridge project, which was completed in September 2015, [94] several congestion management approaches were considered and the following was implemented to mitigate congestion and keep traffic moving:

- Maintain three lanes of traffic in each direction across the river;
- Provide additional transit enhancements during peak traffic periods;
- Provide traveler information systems, including low power highway advisory radio, and Intelligent Transportation Systems, including real-time message signs with alternate route suggestions;
- Provide updated freeway guide signing within the immediate project area that reflects temporary access routes during the various phases of construction. Also provide way-finding

[94] https://www.anacostiawaterfront.org/awi-transportation-projects/11th-street-bridge/

signage for freeway access points on local roads in the project study area; and event management systems, such as roving tow services.

Northern Virginia Megaprojects

Northern Virginia Megaprojects[95] are a series of large-scale and simultaneous transportation improvements aimed to ease congestion and provide alternatives to travelers. The projects currently underway include 95 Express Lanes, I-95 Auxiliary and Shoulder Improvements, Dulles Metrorail and BRAC Projects.

In 2007, the Virginia Department of Transportation (VDOT) began a new program of congestion management during the construction of megaprojects. The megaproject-related congestion management provides both "Commuter Solutions" and "Employer Solutions".

"Commuter Solutions" include resources on teleworking, vanpooling, carpooling, Guaranteed Ride Home, and walking/bicycling.

"Employer Solutions" provides assistance to employers to help them create new approaches or enhance existing services to keep their employees moving during construction.

SafeTrack

WMATA's SafeTrack is an accelerated track work plan to address safety recommendations and rehabilitate the Metrorail system to improve safety and reliability. The plan condenses approximately three years' worth of work into one year and is doing so by extending maintenance time by expanding maintenance time on weeknights, weekends, and middays periods as well as 15 "Safety Surges" which will be long duration track outages beginning in June 2016 for major projects in key parts of the system.

As of the time of this report, the SafeTrack was completed and staff analysis indicated minimal impact on the road system, [96].

[95] http://www.vamegaprojects.com/ Accessed June 7, 2016
[96]https://www.mwcog.org/about-us/newsroom/2016/07/19/how-safetrack-has-impacted-traffic-on-area-roadways-so-far-metro-traffic-monitoring/