DIRECTION 2045

LONG RANGE TRANSPORTATION PLAN

HEPMPO Hagerstown/Eastern Panhandle Metropolitan Planning Organization

DIRECTION 2045

FINAL REPORT • APRIL 11, 2018

Hagerstown/Eastern Panhandle Metropolitan Planning Organization
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RESOLUTION NUMBER 2018-13

A RESOLUTION BY THE HAGERSTOWN/EASTERN PANHANDLE METROPOLITAN PLANNING ORGANIZATION (HEPMPO) TO ADOPT THE DIRECTION 2045: LONG RANGE TRANSPORTATION PLAN

RECITALS

WHEREAS, the MPO is required to approve an updated Long Range Transportation Plan in accordance with federal requirements stated in the Fixing America's Surface Transportation (FAST) Act; and

WHEREAS, the updated Long Range Transportation Plan was prepared by consulting firm Michael Baker International, with extensive input from local elected officials, county and city staff, and the public; and

WHEREAS, opportunities for public input prior to development and after preparation where provided for; and

WHEREAS, the update plan has been developed to be fiscally constrained; and

WHEREAS, the proposed Long Range Transportation Plan will cover the time period from July 2018 through July 2022;

NOW, THEREFORE, BE IT RESOLVED by the HEPMPO that the Direction 2045: Long Range Transportation Plan is hereby adopted.

PASSED AND DULY ADOPTED after motion this 11th day of April 2018;

HAGERSTOWN/EASTERN PANHANDLE
METROPOLITAN PLANNING ORGANIZATION

By: _____
Mark S. Baldwin, Chairman

Attest: _____

FINAL REPORT

DIRECTION 2045 LONG - RANGE MULTIMODAL TRANSPORTATION PLAN

For the Hagerstown/Eastern Panhandle Metropolitan Area

PREPARED FOR:

Hagerstown/Eastern Panhandle Metropolitan Planning Organization
Hagerstown, Maryland

PREPARED BY:

Michael Baker International
Linthicum, Maryland

WITH:

Foursquare Integrated Transportation Planning
Rockville, Maryland

Integrated Designs Incorporated
Glen Burnie, Maryland

July 1, 2018

HEPMPO TITLE VI NONDISCRIMINATION STATEMENT

The Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO) fully complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations prohibiting discrimination in all programs and activities.
For more information, or to file a Title VI related complaint, see www.hepmpo.net or call (240) 313-2080.
If information is needed in another language, then contact (240) 313-2080.

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INTRODUCTION

WHAT IS THE LRTP?

The long-range transportation plan (LRTP) is the vision for maintaining and enhancing the regional multimodal transportation system for the next 25 years. The plan identifies the region's critical needs and challenges, providing a framework to guide decision-making for future transportation investments. The LRTP serves as the region's guiding document to visualize the expected growth and future transportation system and service needs. It presents a balanced approach of meeting the region's goals and objectives by relying on local insight and data to predict the transportation needs and identify solutions for enhanced efficiency and functionality. By understanding future fiscal constraints, the LRTP presents an analytical approach to improve multimodal connectivity with the enhancement of highway, transit and bicycle/pedestrian facilities in the region, while ensuring environmental compliance and transportation safety.

WHAT IS THE MPO?

The Hagerstown / Eastern Panhandle Metropolitan Planning Organization (HEPMPO) is the federally designated Metropolitan Planning Organization (MPO) for the Hagerstown, MD--WV--PA urbanized area. The MPO is responsible for developing the regional LRTP and four-year Transportation Improvement Program (TIP) by allocating federal transportation funding through a comprehensive, collaborative and continuing transportation planning forum for public decision-makers.

HEPMPO's Mission

Provide a cooperative forum for regional collaboration, planning and public decision-making for short- and long-term solutions that supports mobility needs, economic development, environmental sensitivities, and multimodal connectivity for a safe, secure, and efficient transportation system.

The HEPMPO was organized in 1996 and is the federal and state designated regional transportation planning body for the urbanized portions of Berkeley and Jefferson Counties, West Virginia; Washington County, Maryland; and a small portion of Franklin County, Pennsylvania. The urbanized area was expanded after the 2010 U.S. Census to incorporate sections of Berkeley and Jefferson Counties, and the municipalities of Martinsburg, Inwood, Hedgesville, WV, Boonsboro, MD, and a small portion of Franklin County that includes the borough of Greencastle.

The HEPMPO updates the LRTP every four years (five years if compliant with air quality standards) to capture the changes affecting transportation in the region over the next 20 to 25 years. The HEPMPO staff work in conjunction with the Washington County Planning Department (MD) and the Region 9 Planning and Development Council (WV) as well as public, state and local agencies and planning partners to accomplish the transportation goals of the region. The process provides the information, tools and public input needed for improving transportation system performance and reflects the community's vision for its future. It includes a comprehensive consideration of possible strategies; an evaluation process that encompasses diverse viewpoints and an open, timely, and meaningful involvement of the public. It fosters involvement by all interested parties, such as the community groups, environmental organizations, the business community, and stakeholders through a proactive public participation process.

HEPMPO STRUCTURE

The HEPMPO tiered structure is governed by a Policy Board, known as the Interstate Council (ISC), and includes a Technical Advisory Committee (TAC) and Air Quality Advisory Committee (AQAC). The ISC serves as the MPO decision-making body, and is responsible for formally adopting the LRTP and endorsing all MPO activities including planning studies, LRTP and Transportation Improvement Program (TIP) amendments and other committee actions. In accordance with the HEPMPO's bylaws, the ISC is comprised of 17 members including 15 voting and two non-voting members representing state departments of transportation, public transit operators, and local elected officials from the following organizations:

- City of Hagerstown, Maryland;
- Washington County, Maryland;
- Berkeley County, West Virginia;
- Jefferson County, West Virginia;
- City of Martinsburg, West Virginia
- City of Ranson, West Virginia
- Town of Boonsboro, Maryland
- Maryland Department of Transportation (MDOT);
- West Virginia Department of Transportation (WVDOT);
- Eastern Panhandle Planning and Regional Development Council (Region IX);
- Washington County Transit;
- Eastern Panhandle Transit Authority (EPTA)
- Pennsylvania Department of Transportation (non-voting); and
- Franklin County (non-voting).

A TAC was established to provide technical assistance and recommendations to the ISC. The TAC is comprised of transportation professionals from Maryland and West Virginia, and includes representatives from other relevant organizations within the aviation, freight, economic development, engineering, and transit communities. The TAC is charged with five general responsibilities:

1. Oversight of technical work;
2. Coordination of the LRTP;
3. Compliance with State or Federal regulations;
4. Review and recommendation of TIP projects and amendments; and,
5. Review and recommendation of new projects and proposals.

The Air Quality Advisory Committee (AQAC) is a sub-committee of the Technical Advisory Committee charged with reviewing projects in the TIP, LRTP, or special studies for compliance with transportation conformity. This group meets on an as-needed basis and acts in an advisory capacity to the ISC.

The HEPMPO region is currently in attainment of all the criteria air pollutants for the National Ambient Air Quality Standards (NAAQS) as designated and classified by the United States Environmental Protection Agency (U.S. EPA). The NAAQS establish the monitored standard for air pollutants like ozone and particulate matter considered harmful to public health and the environment and are reviewed and periodically updated by U.S. EPA. Washington and Berkeley Counties were in nonattainment of the 1997 annual fine particulate (PM2.5) standard, but has been redesignated based on actual air quality monitoring data. As a result, the region is not subject to transportation conformity.

HEPMPO STUDY AREA

The **Direction 2045** study area, illustrated in **Figure 1-1**, includes Washington County, Maryland and Berkeley and Jefferson counties, West Virginia. Under an agreement with HEPMPO and the Franklin County MPO, the small portion of Franklin County, Pennsylvania that is part of the metropolitan area was not included in this LRTP update.

The total study area is almost 1,000 square miles, with a 2016 population of approximately 320,000 persons. Washington County represents approximately 458 square miles, Berkeley County represents about 321 square miles, and Jefferson County represents about 210 square miles.

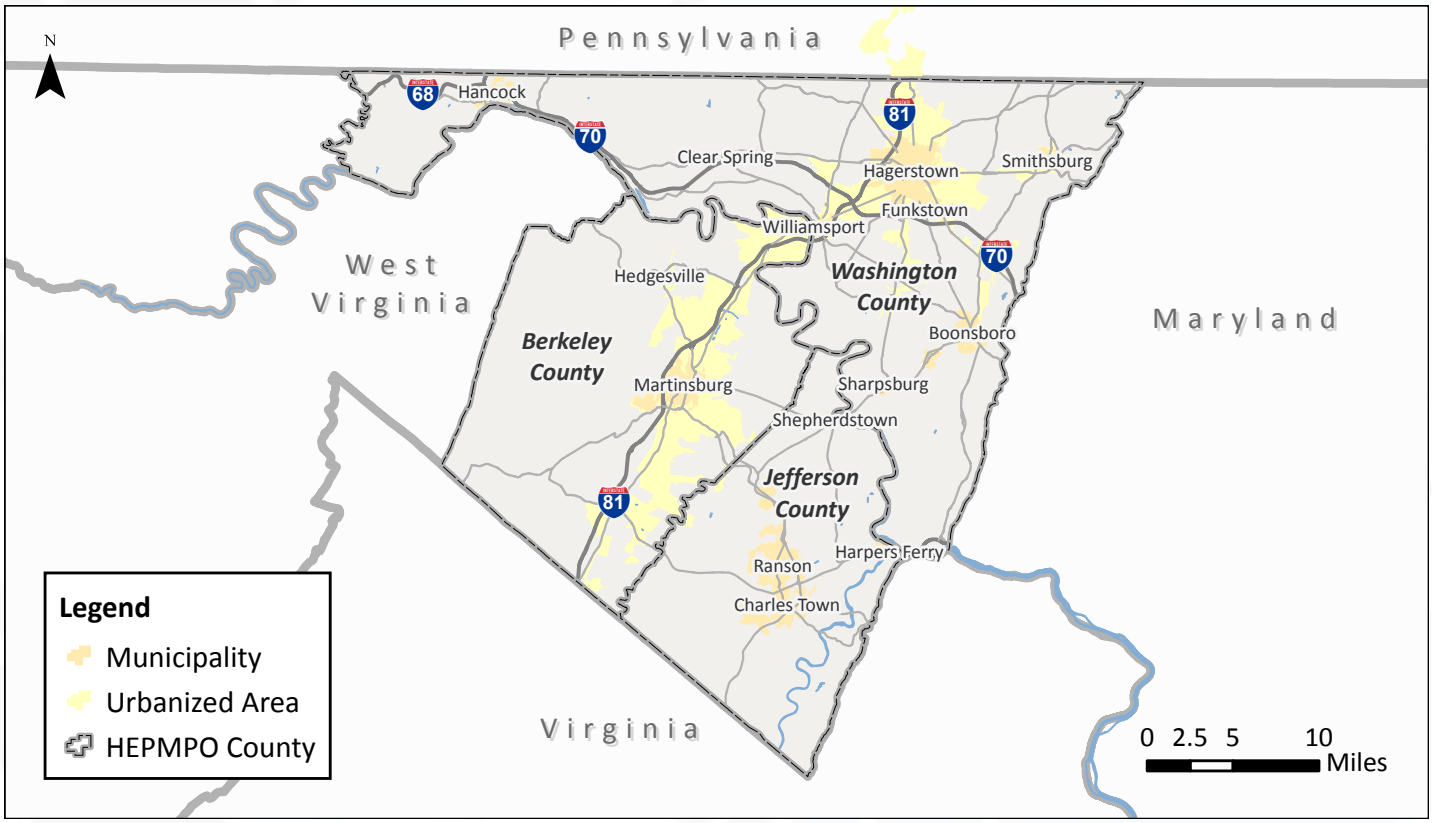


Figure 1-1: HEPMPO Study Area

GOALS AND OBJECTIVES

The establishment of goals and objectives is one of the critical first steps in the LRTP planning process. The goals and objectives identified in the previous LRTP were updated based on a review of existing county comprehensive planning documents, as well as input from appropriate state, local, and public stakeholders. The goals and objectives were also developed to address the ten Fixing America's Surface Transportation Act (FAST Act) planning factors that are required to be considered in metropolitan planning, as well as the seven national goals for the Federal Highway Administration (FHWA) transportation system (right).

Goals are broad statements that describe a desired end state. The goals tie directly into specific, measurable and actionable objectives, which are often developed in connection with the selection of performance measures. These objectives and performance measures, in turn, are used to develop targets or desired trends and are a basis for selecting and analyzing strategies for the LRTP. The strategies may include specific MPO actions that can be conducted to address the goals and objectives.

GOALS
Expands on the Vision Statement in seven areas of emphasis

OBJECTIVES
Defines focused elements of the Goals

PERFORMANCE MEASURES
Tracks progress in achieving the Objectives and Targets

STRATEGIES AND POLICIES
Details an approach to meet the Performance Measure

DIRECTION 2045 GOALS, OBJECTIVES, AND STRATEGIES

SYSTEM PRESERVATION GOAL: *Improve the efficiency and quality of the transportation network through proactive planning, technology, and maintenance.*

OBJECTIVES

- Maximize useful life of assets through prioritized infrastructure repair and maintenance.
- Ensure safe travel along the region's multimodal transportation system through a properly preserved system.

STRATEGIES

- Monitor WVDOT and MDOT infrastructure improvement priorities and asset management practices and procedures. Integrate available information in the LRTP for sharing with public.
- Monitor asset conditions and deficiencies (e.g. pavement and bridge ratings) in coordination with each state DOT.
- Identify and convey system preservation needs through MPO outreach efforts and the LRTP.

SYSTEM MOBILITY GOAL: *Improve the reliability of the transportation system and promote efficient system management and operations.*

OBJECTIVES

- Reduce traffic congestion on primary travel corridors within the region.
- Maintain reliability and performance for freight, transit, bike and pedestrian modes of travel.
- Integrate technologies, techniques, and programs to maximize the efficiency of the existing system.

STRATEGIES

- Monitor traffic congestion performance measures across the region using available GPS travel time data and travel demand model forecasts. Report and map performance measures for integration into planning documents.
- Evaluate public comments on traffic congestion priorities and needs.
- Identify and prioritize transportation projects through the LRTP.
- Monitor regional freight reliability, needs and trends within the region. These efforts will require coordination with state DOTs and other regional planning efforts (e.g. I-81 Corridor Coalition).
- Coordinate with local transit agencies to identify reliability issues and potential strategies. Conduct bike and pedestrian studies to identify performance issues and potential strategies.
- Support local corridor studies of new technologies including electric vehicles (EV), intelligent transportation system (ITS), adaptive signals, automated and connected vehicle (CAV) infrastructure.
- Coordinate with state DOTs on statewide efforts related to technology, including CNG for transit vehicles.
- Support grant development and provide grant assistance to local, regional, and state

MULTIMODAL TRANSPORTATION GOAL: *Encourage alternative modes of transportation through multimodal network improvements and innovative marketing strategies.*

OBJECTIVES

- Improve and enhance regional and long-distance transit usage and coverage within the region.
- Improve and enhance bicycle and pedestrian facilities within the region.

STRATEGIES

- Support transit agencies with efforts to evaluate transit routes and demand including the agency Transit Development Plan.
- Monitor transit ridership trends for key transportation corridors.
- Identify alternative transportation project needs.
- Conduct additional studies to support the operations and improvements of the transit system.
- Conduct bicycle and pedestrian studies to identify needs and strategies with special consideration for traditionally underserved populations and first and last mile connections to transit.
- Support improvements in transit connectivity, especially for long-distance systems.
- Monitor regional trends in ridesharing platforms.

ECONOMIC PROSPERITY GOAL: *Improve access to social and economic opportunities.*

OBJECTIVES

- Provide safe, reliable, and affordable connections to employment, education, healthcare, and other essential services.
- Provide for the efficient movement of goods by rail and truck and improve connections to global markets.
- Enhance travel and tourism connectivity to regionally and nationally significant resources.

STRATEGIES

- Work with county and municipal staff to identify key services in need of improved infrastructure connections.
- Conduct outreach to local businesses and freight generators, such as Norfolk Southern and CSX, to identify transportation issues and needs including improvements to first and last mile connections.
- Coordinate with stakeholders, local municipalities, and transit agencies to identify workforce transportation needs.
- Work with local stakeholders to identify transportation projects that provide economic benefits to the region.
- Provide emphasis to those projects within the LRTP project prioritization process.
- Conduct outreach to low-income and minority populations to identify opportunities and transportation investments that serve such populations.

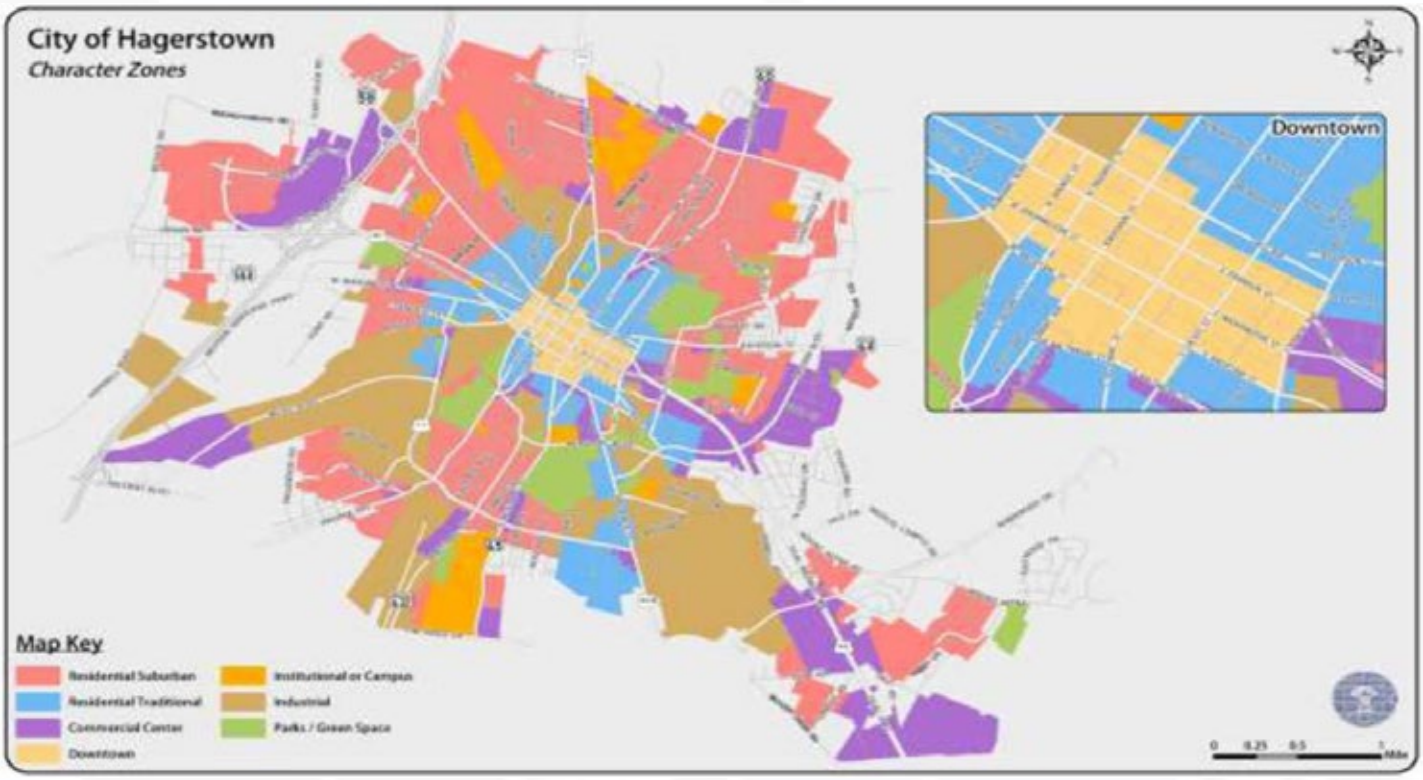
LAND USE AND TRANSPORTATION INTEGRATION GOAL: *Align local planning efforts with regional transportation initiatives and promote smart growth practices.*

OBJECTIVES

- Incorporate and coordinate transportation improvements with existing and planned future land uses to minimize infrastructure cost.

STRATEGIES

- Using the travel demand model, coordinate transportation projects with land use plans to maximize connectivity of the transportation network to key destinations, such as employment centers, residential areas, and downtown business districts.
- Support local cities and towns in development of complete streets policies to accommodate all users of the transportation system.
- Conduct studies in support of the linkages of Transit Oriented Development (TOD) to the region's transportation system.
- Encourage coordination, cooperation, and collaboration between municipalities.
- Review and comment on development site plans as is consistent with the MPO's vision.



ENVIRONMENTAL STEWARDSHIP GOAL: *Minimize the impacts of the transportation network on the environment and increase the resiliency of transportation assets.*

OBJECTIVES

- Improve air quality through the reduction of emissions.
- Increase system resiliency to existing and future climate and extreme weather impacts
- Promote coordination of planning to avoid disturbance of sensitive natural areas and historical properties while minimizing transportation impacts on neighborhoods.

STRATEGIES

- Monitor greenhouse gas emission trends from the transportation sectors for existing and LRTP horizon years.
- Support states with efforts to maintain attainment of air quality standards.
- Support planning and environmental linkage studies (PEL) within the region to identify environmental constraints and issues early in the project development phase.
- Identify transportation infrastructure vulnerable to extreme weather (e.g. flooding).
- Incorporate environmental justice and other environmental mapping within the region and project prioritization process.
- Promote context sensitive design of transportation facilities within the region.
- Support stormwater requirements for transportation facilities to reduce pollution and restore the Chesapeake Bay.

SAFETY AND SECURITY GOAL: *Promote a safe and secure regional transportation network that will support emergency preparedness and evacuation planning.*

OBJECTIVES

- Reduce injuries and fatalities along the region's multimodal transportation system.
- Improve the security of the transportation system's users through the coordination of agencies, responders, and departments (transportation and non-transportation).

STRATEGIES

- Identify and coordinate with regional hazard mitigation, emergency management and evacuation planning.
- Coordinate with local agencies and state DOTs to monitor and report crash and accident rates within the region.
- Provide emphasis to transportation projects that address and improve safety of the transportation system.
- Conduct local safety studies including pedestrian safety audits on high accident corridors to identify potential improvement strategies.
- Identify multimodal conflicts, such as unsignalized, at-grade railroad crossings.

FAST ACT COMPLIANCE

In July 2012, the President of the United States signed into law a transportation planning bill known as Moving Ahead for Progress in the 21st Century Act (MAP-21). MAP-21 established provisions to the metropolitan planning process that are designed to establish a transparent and accountable decision-making framework for the MPO to identify multi-modal capital investment and project priorities. In December 2015, the FAST Act was passed, which continues new performance based planning and programming (PBPP) initiatives for metropolitan transportation planning introduced in MAP-21.

MD Route 34 into Shepherdstown, WV

MAP-21 and the FAST Act have provided the impetus for several recent USDOT rulemakings requiring the monitoring and reporting of defined national performance measures for transportation. These requirements attempt to ensure that transportation investment decisions are made by their ability to support established goals for improving the overall system. At the MPO level, performance measures developed in cooperation with the state Department of Transportation (DOT) will be used to establish performance targets to track progress of attaining critical performance results. The measures address infrastructure condition (bridges and pavement), safety, system performance (traffic reliability), freight movement, and air quality.

Figure 1-2: Overview of FAST Act Transportation Performance Management (TPM)

TRANSPORTATION PLANNING PROCESS

The **Direction 2045** LRTP is a comprehensive guide to developing the regional transportation system that not only accommodates the current mobility needs, but also anticipates where future needs may arise. In response to the federal mandates and local desires, the LRTP addresses multiple modes of transportation including highway, bicycle, pedestrian, transit, freight and safety.

Federal legislation, coupled with state and local agency direction, is primarily responsible for shaping the regional transportation planning process. The FAST Act builds upon previous legislation known as MAP-21 and identifies ten planning factors that guide the MPO long range transportation planning process. The goals developed for **Direction 2045** closely resemble the FAST Act Planning Factors as shown in **Table1-1**.

Table 1-1: FAST Act Planning Factors with Corresponding Direction 2045 Goals

FAST Act Planning Factors	Corresponding Direction 2045 Goals
Support the economic vitality of the metropolitan area by enabling global competitiveness, productivity, and efficiency	Economic Prosperity
Increase the safety of the transportation system for motorized and nonmotorized users	Safety and Security
Increase the security of the transportation system for motorized and nonmotorized users	Safety and Security
Increase the accessibility and mobility of people and for freight	Multimodal Transportation
Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns	Environmental Stewardship
Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight	Land Use and Transportation Integration
Promote efficient system management and operation	System Preservation
Emphasize the preservation of the existing transportation system	System Preservation
Improve resiliency and reliability of the transportation system and reduce impacts of surface transportation	Environmental Stewardship
Enhance travel and tourism	Economic Prosperity

The HEPMPO's planning process involved participation from a diverse group of technical advisors, stakeholders, members of transit-dependent populations, and the general public. Outreach activities included stakeholder and public outreach through an interactive web-based survey, public meetings, and intercept surveys as well as the dedicated section on the HEPMPO website, www.hepmpo.net.

Figure 1-3 illustrates the steps taken in order to complete the LRTP update. The figure emphasizes the fact that public involvement and stakeholder input were integral in every step of the development of **Direction 2045**. Later sections of this document provide greater detail on the key steps of the process.

Direction 2045 represents the culmination of a multi-level partnership between local, state, and federal policy makers and the local stakeholders, business owners, and citizens from the region. The plan builds upon the region's existing plan by refining the prioritization for project funding, enhancing the multimodal policies and initiatives, and identifying key unfunded regional transportation priorities.

Figure 1-3: Direction 2045 Development Process

Multi-modal Integration to Performance Planning

Washington Street in Downtown Hagerstown

EXISTING PLANS

State and local plans serve as the guiding planning documents as they set forth guidelines, goals and objectives for activities affecting growth and development within each jurisdiction. The **Direction 2045** study team reviewed the various plans in order to gather necessary data and gain local, regional and statewide insight into goals, programs, policies and recommended projects. The plans are multimodal, in nature, and reflect highway recommendations, bicycle and pedestrian connectivity, safety and security planning, freight priorities and transit needs.

Table 1-2: State and Regional Plans Supporting Direction 2045

Study Name	Agency/Organization	Date
West Virginia Strategic Highway Safety Plan	WVDOT	2017
Maryland Strategic Highway Safety Plan	MDOT	2017
Maryland Transportation Plan	MDOT	2016
Berkeley County Comprehensive Plan	Berkeley County, WV	2016
Maryland Strategic Goods Movement Plan	MDOT	2015
Jefferson County Comprehensive Plan	Jefferson County, WV	2015
Maryland Bike and Pedestrian Master Plan	MDOT	2014
Charles Town Comprehensive Plan	City of Charles Town, WV	On-going
West Virginia Transportation Plan	WVDOT	On-going
West Virginia State Freight Plan	WVDOT	On-going
Statewide Bicycle Connectivity Plan	WVDOT	On-going
US 340 Operational Improvements Study	WVDOT	On-going
Washington County Comprehensive Plan	Washington County, MD	On-going
Corridor Management Handbook	WVDOT	N/A
Planning Guidance	WVDOT	N/A

The development of **Direction 2045** utilized an analytical approach relying on a balance between local expertise and data in determining current and future needs. The data and models used for the analyses can provide trends and quantitative results, but cannot account for land use policies, shifting economic development strategies, or changing demographics. Stakeholder engagement and public input prove critical in obtaining qualitative information and refining future forecasts.

CHAPTER TWO
REGIONAL PROFILE

SITE AND SITUATION

The HEPMPO region is located less than 50 miles Northwest of Washington, D.C., at the nexus of several prominent transportation routes including interstates, such as I-81 and I-70, U.S. routes, such as US 11, 40, and 340, as well as other state routes and local roadways.

The HEPMPO region also has an extensive rail network that supports the movement of freight from the east coast and Great Lake ports to markets throughout the United States. Norfolk Southern owns rail lines that run parallel to I-81 and operates freight distribution centers in the Franklin County Regional Intermodal Facility in Greencastle, Pennsylvania and the Virginia Inland Port in Front Royal, Virginia. CSX owns and operates the east/west rail lines that run through Harper's Ferry and continue west as part of the National Gateway initiative to support double stacking of freight containers.

Commuter trains operated by the Maryland Area Regional Commuter (MARC) system have approximately 22 miles of rail service running through the HEPMPO region. The MARC Brunswick Line runs from Washington, D.C., to Martinsburg with stops in Harpers Ferry, Duffields, and Martinsburg. Amtrak also services the region, with stops in Harpers Ferry and Martinsburg, via the Capitol Limited line, which runs from Washington, D.C., to Chicago.

INTERSTATE HIGHWAYS

I-81 and I-70 are the two major interstate highways that travel through the study area, intersecting just southwest of Hagerstown. I-81 travels north/south from Tennessee to the Canadian border. Traveling north, the interstate crosses into West Virginia at the Berkeley County line, travels through Martinsburg, and across the Potomac River into Maryland near Williamsport. Once in Maryland, the corridor intersects with I-70 just before passing through the western part of Hagerstown and proceeds north through the remainder of Washington County before entering Pennsylvania. I-81 parallels US 11 for most of its path and is a popular route for freight movement as it remains mostly rural, avoiding many major traffic congestion points in the Northeast. In contrast, I-70 travels east/west from Baltimore, Maryland to Cove Fort, Utah. Traveling across most of the state, I-70 is a major east/west corridor in Maryland. Traveling west, I-70 enters the study area from Frederick County near Greenbrier State Park and continues west passing just south of Hagerstown and across the Maryland panhandle. Interstate 70 then crosses into into Pennsylvania just north of the Town of Hancock in Washington County. At this junction, I-68 travels west crossing into West Virginia.

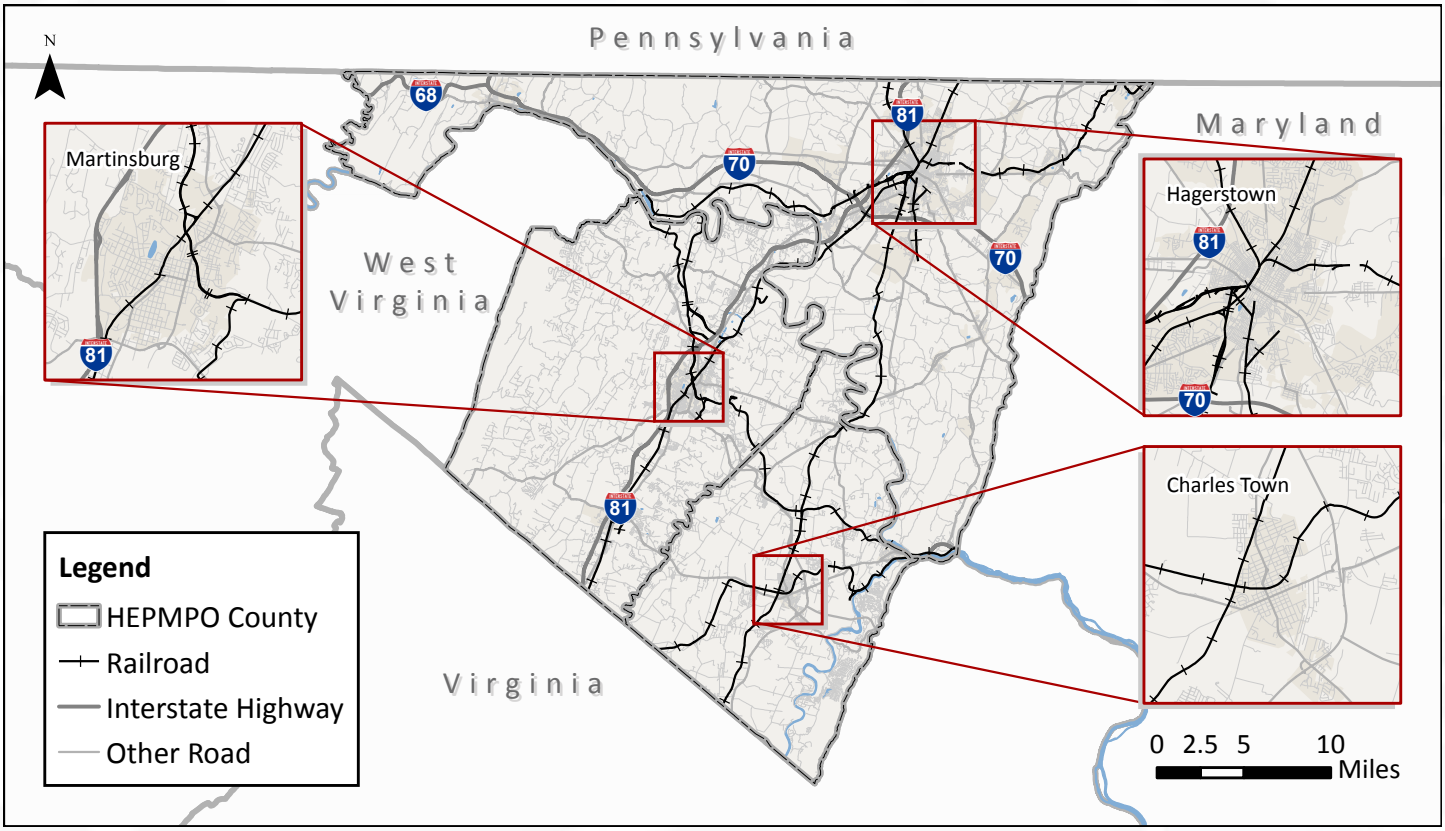


Figure 2-1: HEPMPO Transportation Network

U.S. ROUTES

The HEPMPO region is also served by several U.S. Highways. These routes include US 11, 40, 340, and 522. As mentioned previously, US 11 parallels I-81 while US 40 parallels I-70. US 11 travels north/south through the study area, serving Martinsburg, Williamsport, and Hagerstown. US 40 travels east/west through the Maryland panhandle. US 340 enters the study area from Frederick County, Maryland and crosses the Potomac River near Harpers Ferry. After intersecting WV 9, this north/south route travels through the Charles Town/Ranson area, exiting Jefferson County into Virginia. At that point US 340 intersects VA 7, which connects to Winchester in the west and Tyson's Corner and the Washington Beltway (I-495) in the east. US 522 enters the MPO region very briefly as it passes through Hancock, intersecting with I-70.

DEMOGRAPHIC AND EMPLOYMENT TRENDS

POPULATION

According to the 2016 U.S. Census Bureau's Annual Estimate of the Resident Population, the HEPMPO region has a population of 320,185, including Washington County (150,292), Berkeley County (113,525), and Jefferson County (56,368). In Washington County, population is concentrated around Hagerstown and along I-81, as well as smaller pockets of population in the areas of Smithsburg and Boonsboro. In Berkeley County, population is concentrated along the I-81 corridor, especially in the Martinsburg area. In Jefferson County, population is concentrated in the Charles Town/Ranson and Shepherdstown areas and along US 340. **Figure 2-2** illustrates the population growth relative to the 2006 population estimates for each county. From 2006 to 2016, the region's overall population increased by approximately 10.0%, with county population increases of 4.2%, 17.9%, and 12.7% for Washington County, Berkeley County, and Jefferson County, respectively. **Figure 2-3** illustrates the distribution of population within the HEPMPO region in 2016 by Census block group.

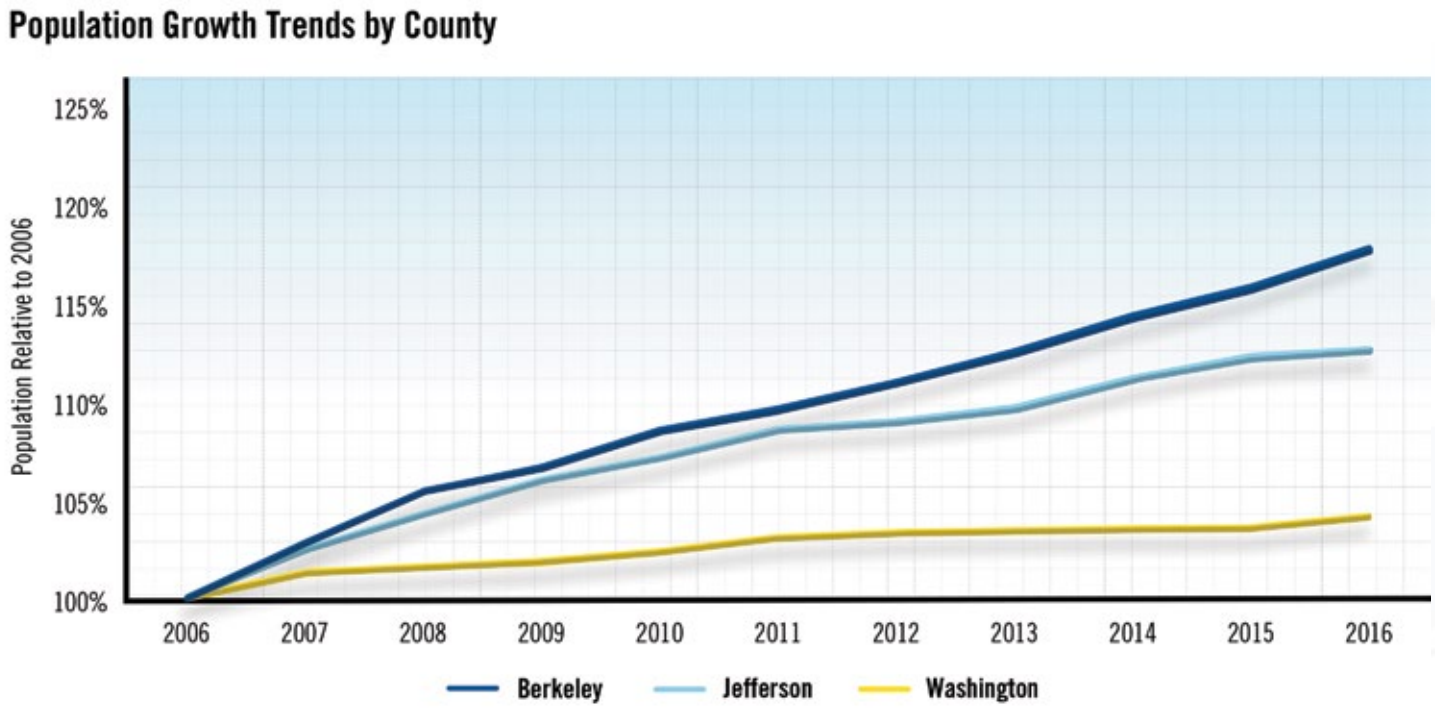


Figure 2-2: Population Relative to 2006

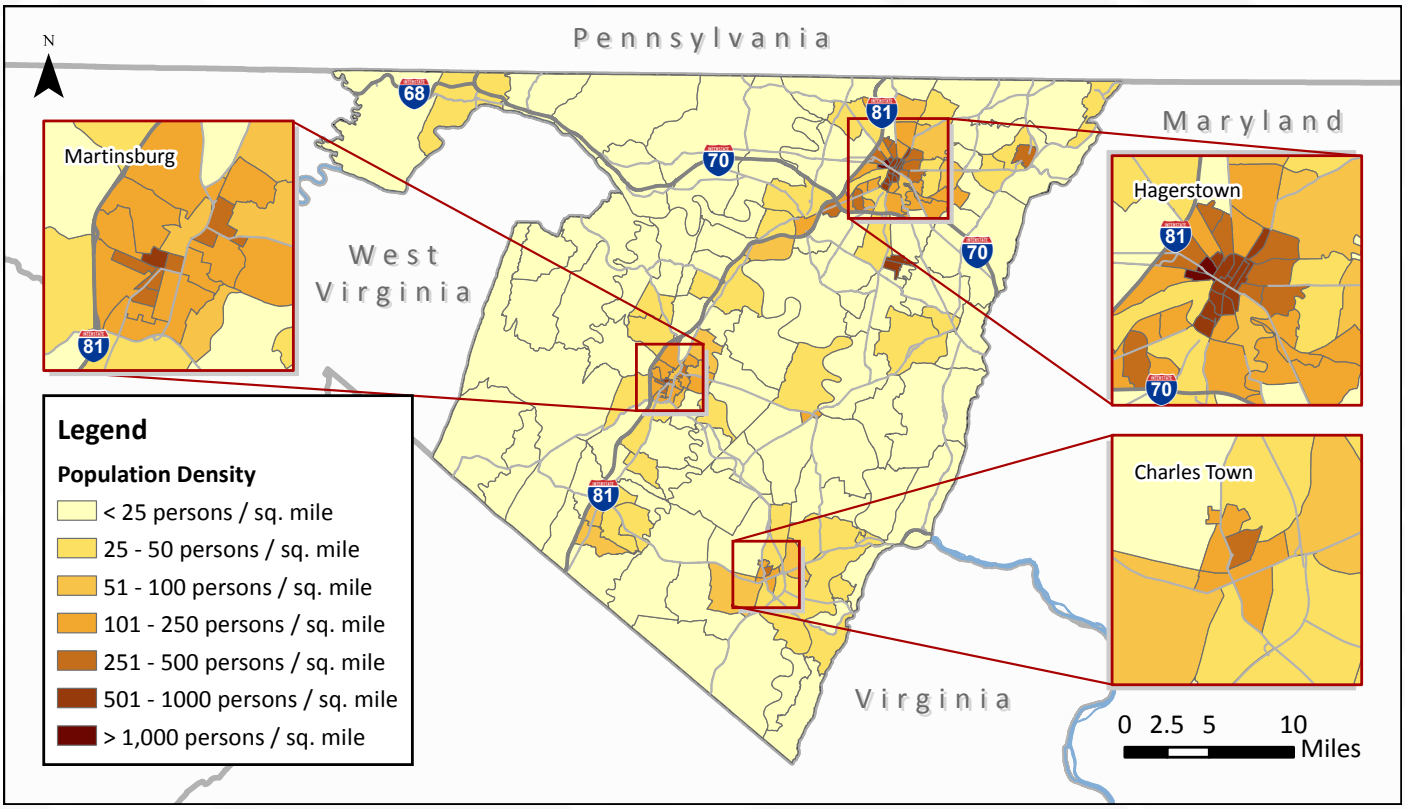


Figure 2-3: 2016 Population Density of the Region

HOUSING UNITS AND HOUSEHOLDS

There are a total of 131,855 housing units located within the HEPMPO study area. As with the population figures, Washington County has the highest number of housing units at 61,525, followed by Berkeley County with 47,353 housing units, and Jefferson County with 22,977 housing units. Growth trends for the number of housing units by jurisdiction represent a similar pattern to the population trends between 2007 and 2016 (2006 housing unit data is unavailable).

Berkeley County had the highest estimated housing growth at 14.8%, followed by 8.8% for Jefferson County, and 3.6% for Washington County. The growth of housing units in Washington County and Berkeley County exceeded population growth between 2006 and 2016. On the other hand, the population growth percentage surpassed the growth of housing units for Jefferson County.

Based on the 2015 U.S. Census Bureau's American Community Survey, the average household size in the HEPMPO region was 2.57 persons per household; the mean income was $72,403; and approximately 69.0% of households were owner occupied while the other 31.0% were renter occupied. **Table 2-1** categorizes this data by jurisdiction for comparison. While Jefferson County has the largest household size, highest mean income, and largest percentage of owner-occupied households, it is also the county with the smallest number of households.

Table 2-1: 2015 Regional Household Statistics

Jurisdiction	Total Households	Average Household Size	Median Household Income ($)	Mean Household Income ($)	Owner Occupied	Renter Occupied
Washington County	56,067	2.50	$56,228	$70,993	64.2%	35.8%
Berkeley County	40,991	2.63	$55,239	$69,405	73.2%	26.8%
Jefferson County	20,331	2.65	$66,677	$82,338	74.0%	26.0%
HEPMPO Region	**117,389**	**2.57**	-	**$72,403**	**69.0%**	**31.0%**

EMPLOYMENT

Employment statistics for the HEPMPO planning area were analyzed using the Census Longitudinal Employment Household Dynamics (LEHD) data and information from the Woods and Poole 2016 County Profiles. While Washington County, Berkeley County, and Jefferson County all experienced population growth from 2006 to 2016, the counties experienced dramatic fluctuations in employment over the same time period. Although the counties currently have higher levels of employment relative to 2006 (**Figure 2-4**), the entire region was hit particularly hard by the 2007-2008 global financial crisis, resulting in substantial declines in employment. From 2010 onwards, the region has experienced steady employment growth, with 17.3%, 10.2%, and 8.1% percent employment growth for Berkeley County, Jefferson County, and Washington County respectively.

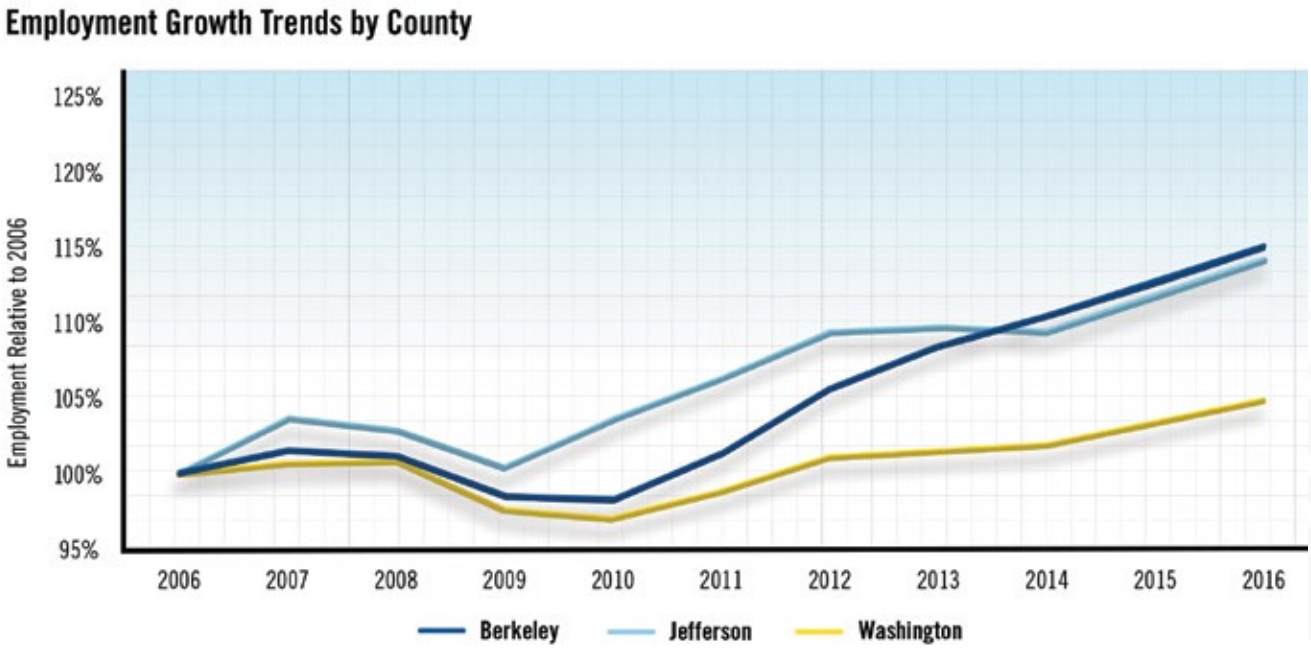


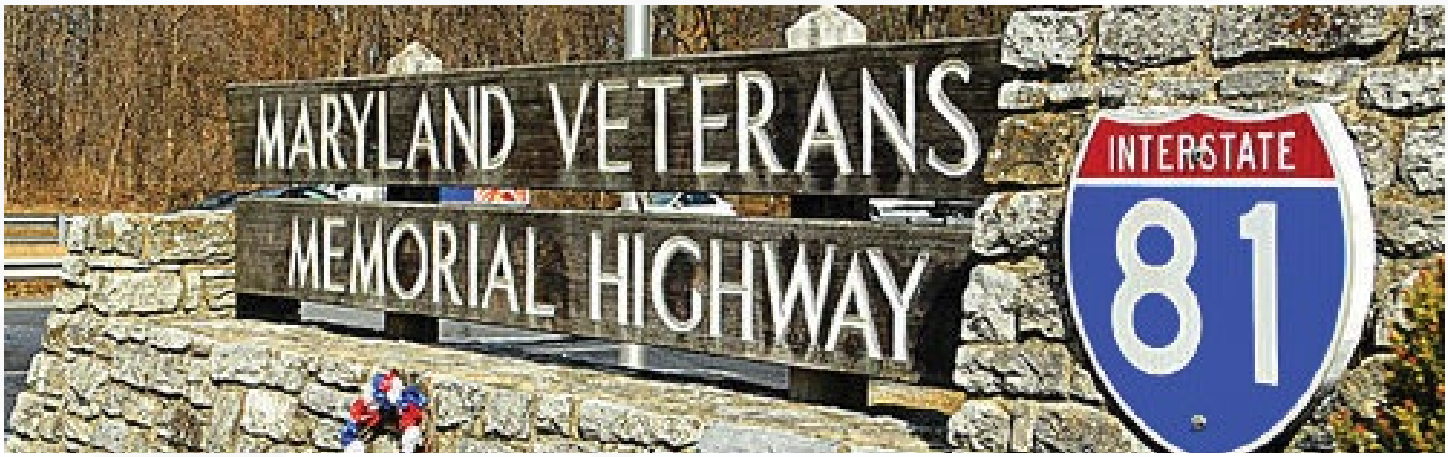
Figure 2-4: Employment Relative to 2006

There are several prominent employers located in the study area; **Table 2-2** lists the ten largest employers, the county in which they are located, and the number of persons employed by each organization as of 2017. Within the top ten largest employers, six are private companies and half are located within Washington County, of the region's most populous county. Only one of the top ten largest employers is headquartered in Jefferson County.

Table 2-2: Ten Largest Employers in the HEPMPO Region

Employer	County	Employees
Washington County Public Schools	Washington	3,100
Meritus Medical Center	Washington	2,740
State of Maryland	Washington	2,612
Berkeley County Board of Education	Berkeley	2,308
Citi	Washington	2,300
First Data	Washington	2,183
Dept. of Veteran Affairs	Berkeley	1,953
Macy's Corporate	Berkeley	1,518
Berkeley Medical Center	Berkeley	1,518
PNGI Charles Town Gaming	Jefferson	1,444

Macy's has 1,518 employees in Berkeley County



A geospatial analysis suggests that employment, like population, is also focused near the I-81 corridor (**Figure 2-5**). This corridor accounts for some of the highest employment concentrations and features prominent employers such as Procter & Gamble, Quad/Graphics, FedEx, the Bowman Group, and the offices for the City of Hagerstown. Citigroup is also located along I-81, just north of Hagerstown, and employs 2,300 people; and a few miles off the I-81 corridor, along Charles Town Road, major employers include the Department of Treasury and the Veterans Administration. There are a few less concentrated employment activity centers away from the I-81 corridor including Shepherd University in Shepherdstown and PNGI Charles Town Gaming in the City of Charles Town.

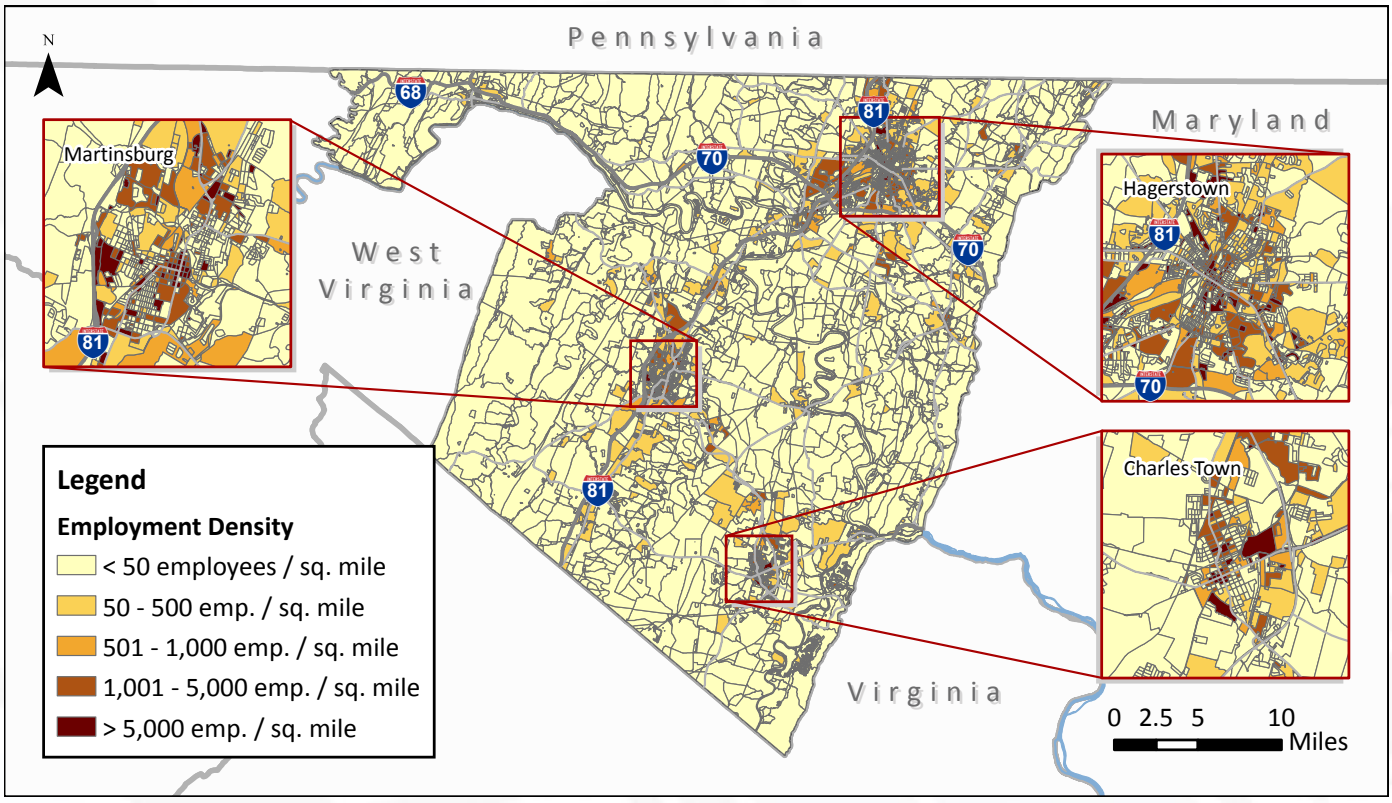


Figure 2-5: 2016 Employment Density of the Region

PROJECTED TRENDS

Socioeconomic forecasts from the Maryland Department of Planning (used for Washington County) and the Woods and Poole 2016 State Profile (used for Berkeley and Jefferson counties) were used to project county population, households, and employment to the Direction 2045 horizon year. **Table 2-3** summarizes the forecast socioeconomic growth.

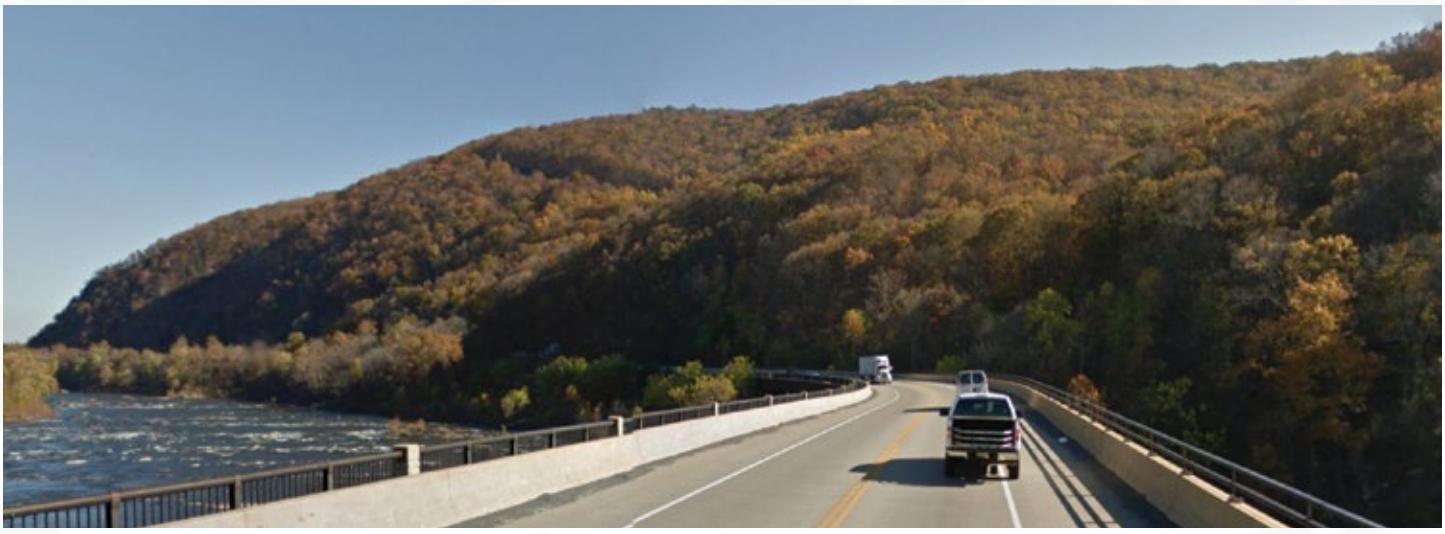
Table 2-3: HEPMPO Region Socioeconomic Growth Forecast

Jurisdiction	Annual Growth Rate			2045 Forecasted Totals		
	Population	Households	Employment	Population	Households	Employment
Washington	0.90%	0.95%	0.65%	197,050	76,114	101,060
Berkeley	1.72%	1.48%	1.71%	187,690	69,262	77,023
Jefferson	1.83%	1.57%	1.89%	97,783	35,647	40,022
HEPMPO Region	1.38%	1.26%	1.20%	482,523	181,023	218,105

To support the travel forecasting process, the county-level forecasts were disaggregated to smaller areas across the tri-county region. Decisions on data disaggregation were based on the following resources:

- Input from MPO and county planning staff;
- Input from each county's economic development authorities;
- Sub-development data (both in GIS and other formats) including available information on timing, acres and/or units; and,
- Assumptions from the previous LRTP.

Figure 2-6 and **Figure 2-7** (on next page) illustrate the spatial distribution of projected growth (by density) for households and employment based on the disaggregation process.



Route 340 Bridge over the Shenandoah River near Harpers Ferry

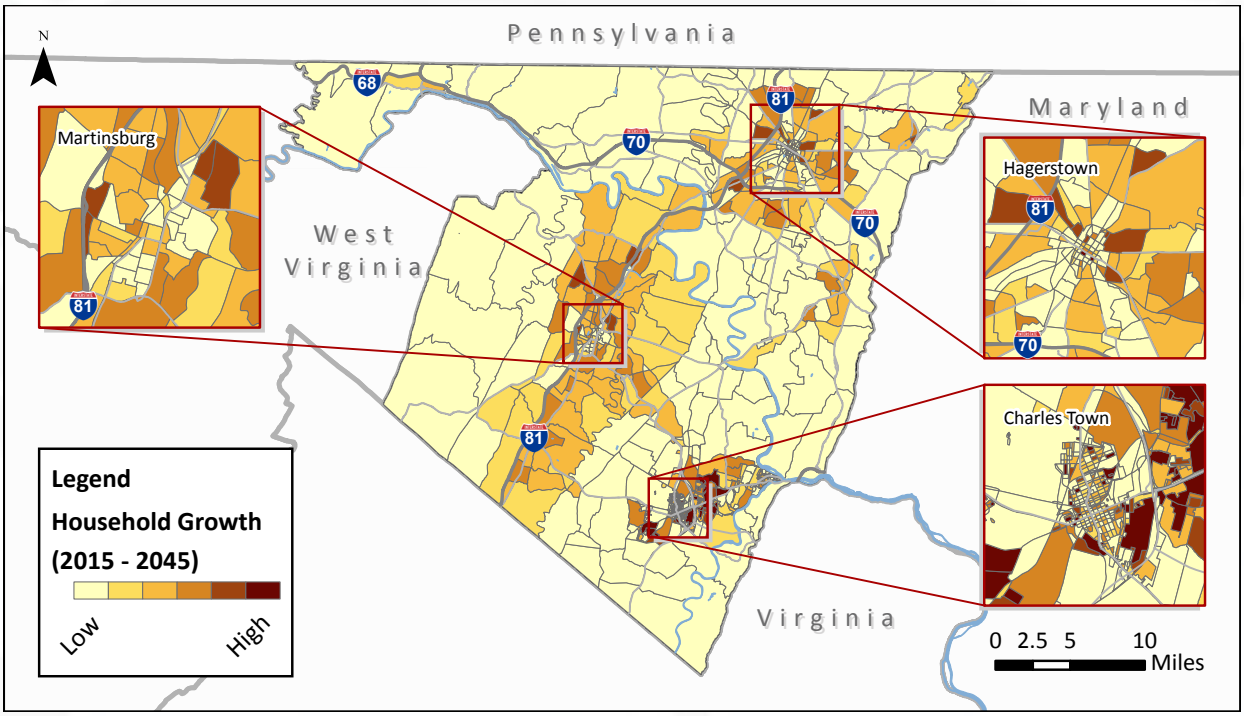


Figure 2-6: Household growth forecast from 2015 to 2045

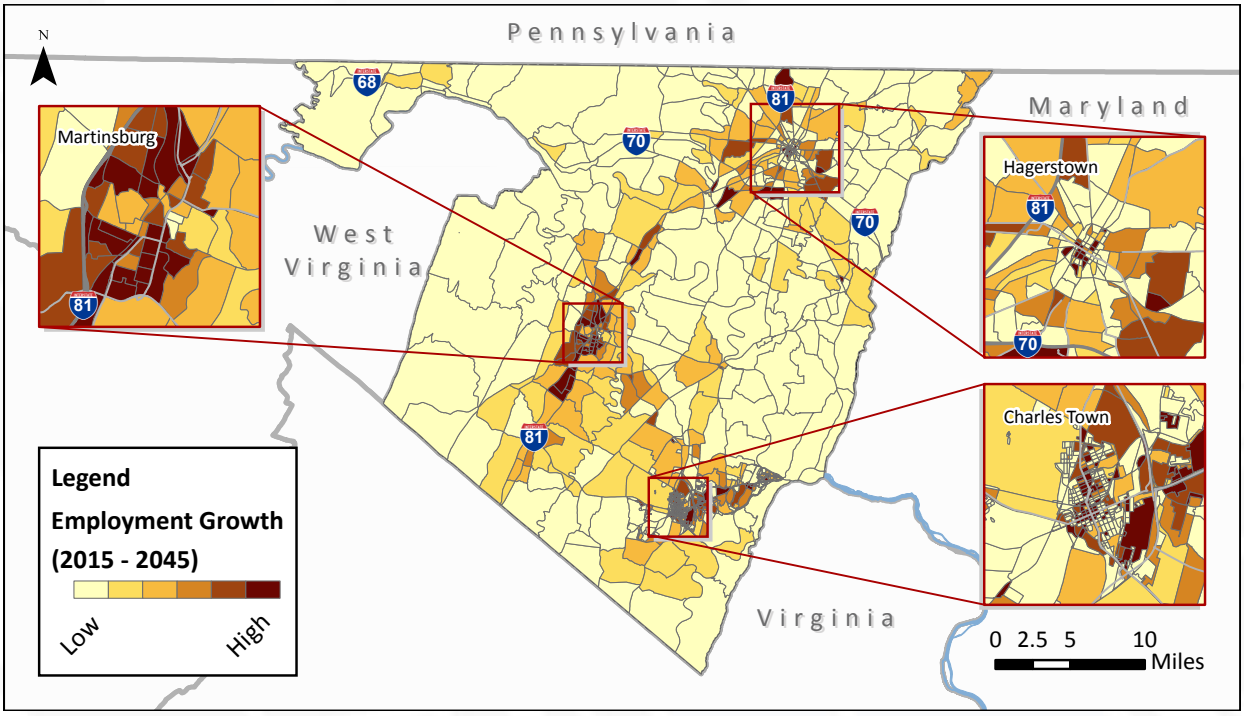


Figure 2-7: Employment growth forecast 2015 to 2045

REGIONAL COMMUTING PATTERNS

An analysis of employee commute trip characteristics, including mode choice and travel time, was conducted for Direction 2045. Approximately 81.5% of commuters in the HEPMPO region drive alone to work compared to the national average of 76.4%. The remaining commuters use the following modes: 10.9% carpool, 1.3% utilize public transit, 2.0% walk or bike, and 4.3% work at home. A breakdown of these figures is illustrated in **Figure 2-8**.

Commute mode selection varies by county. While Berkeley County has the highest percentage of single occupant commutes (82.3%), it also has the highest level of carpooling within the region (12.1%). On the other hand, it has the lowest levels of commuters using public transit (0.9%), walking or biking to work (1.1%), and the fewest percentage of workers who work at home (3.3). Jefferson County shows the highest level of multimodal activity in the region. Less than 79% of Jefferson County residents drive alone to work, over three percent below the region-wide average. Jefferson County also has the highest level of transit use (2.4%), walking or biking to work (3.0%), as well as the highest percentage of workers who work at home (4.9%). Washington County residents' commute choice falls between Jefferson and Berkeley counties for all categories besides carpooling, which is the lowest level in the region at 9.9%.

The U.S. Census Bureau's LEHD can be used to determine where workers live based on the employment in a given geographic area. The employment data are derived from payroll tax (unemployment insurance) payment records maintained by each state. The states assign employer locations, while workers' home locations are assigned by the Census Bureau using data from multiple federal agencies. The 2015 LEHD was summarized for each county in the HEPMPO region using the Census-On-The-Map web-based mapping tool and future commuting patterns can be monitored using newer data within the Census LEHD program as it becomes available. **Table 2-4** illustrates workers' home locations, or commute origins and **Table 2-5** illustrates county residents' work locations, or commute destination, by HEPMPO County.

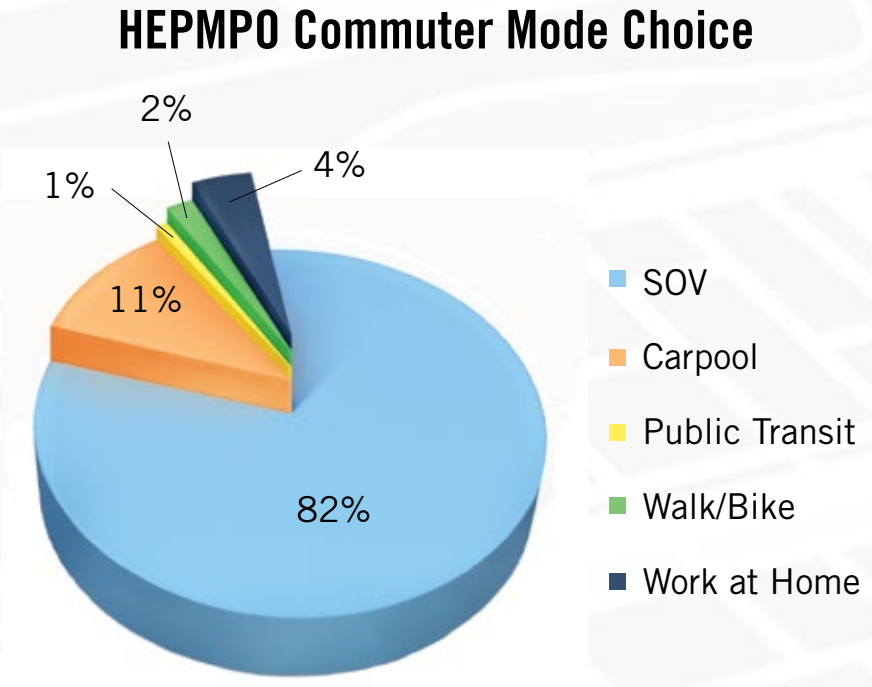


Figure 2-8: Commute Mode for HEPMPO Region

Table 2-4: Workers home location by county

Destination County	Workers' Home Locations (Commute Origin)					
	HEPMPO Region			Other Counties with Highest Percentage		
Washington	**Washington**	Berkeley	Jefferson	Franklin, PA	Frederick, MD	Baltimore, MD
	49.6%	7.8%	< 1.3%	12.8%	6.7%	1.7%
Berkeley	Washington	**Berkeley**	Jefferson	Morgan, WV	Frederick, VA	Loudoun, VA
	4.6%	**64.0%**	9.5%	3.8%	2.8%	1.0%
Jefferson	Washington	Berkeley	**Jefferson**	Frederick, MD	Loudoun, VA	Frederick, VA
	3.8%	27.7%	**48.3%**	3.5%	2.2%	2.1%

Table 2-5: Residents work location by county

Origin County	Residents' Work Locations (Commute Destinations)					
	HEPMPO Region			Other Counties with Highest Percentage		
Washington	**Washington**	Berkeley	Jefferson	Frederick, MD	Montgomery, MD	Franklin, PA
	50.4%	2.4%	<1.8%	12.4%	7.0%	3.8%
Berkeley	Washington	**Berkeley**	Jefferson	Frederick, VA	Winchester City, VA	Fairfax, VA
	10.3%	**43.0%**	8.4%	4.0%	3.6%	3.4%
Jefferson	Washington	Berkeley	**Jefferson**	Loudoun, VA	Fairfax, VA	Frederick, MD
	2.6%	12.8%	**29.3%**	12.9%	8.4%	6.4%

The following observations were made based on the data presented in the preceding tables:

- Over 12.8% of Washington County workers reside in Franklin County, Pennsylvania.
- Despite their proximity to one another, there is not a strong pattern of inter-county commuting across state lines between Washington County and Berkeley County and Washington County and Jefferson County.
- Nearly two-thirds (64.0%) of all Berkeley County workers reside within Berkeley County. This percentage of intra-county workers is substantially higher than that of both Washington and Jefferson counties and may be justified by the fact that Berkeley County is further from other major metropolitan regions (i.e., Baltimore, Washington DC) than these other two counties.
- More than one-quarter (26.8%) of Jefferson County workers reside within Berkeley County.
- The Baltimore-Washington Metropolitan Area is a common commute destination, especially from Washington County to Frederick County, MD (12.4%) and from Jefferson County to Loudon County, VA (12.9%). This pattern can be explained by the lower cost of living in the HEPMPO Region compared to the Baltimore-Washington Metropolitan Area.

CHAPTER THREE
PUBLIC OUTREACH

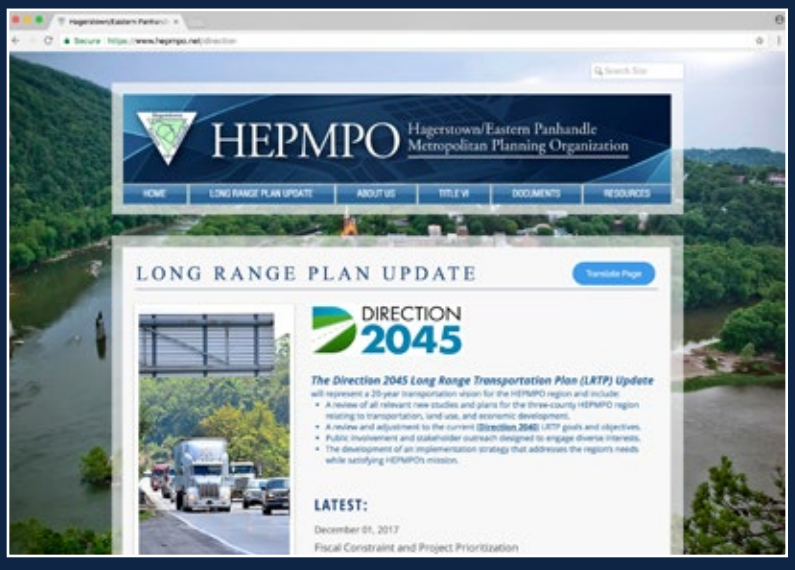
STAKEHOLDER AND PUBLIC INVOLVEMENT

The HEPMPO understands the importance of the public participation process and commits to engaging and providing access to the transportation planning process and documents. The HEPMPO website (www.hepmpo.net) provides notices to the all upcoming events, the LRTP update documents, and decision-making meetings by the governing board (ISC), and is active on social media. HEPMPO has over 190 followers on Facebook. The goals and requirements for **Direction 2045** are included in the HEPMPO Public Participation Plan (https://www.hepmpo.net/documents).

The FAST Act requires MPOs to consult with state and local officials, transit operators, and the public when conducting transportation planning. Direction 2045 was developed through the coordination of a diverse group of stakeholders representing various organizations and interests throughout the study area. These groups included representatives of the sponsoring agencies, members of the Technical Advisory Committee (TAC), as well as citizens.

HEPMPO's TAC, comprised of professionals with local knowledge of the transportation networks, provided technical oversight and input throughout the development of **Direction 2045**. The group was responsible for reviewing various technical planning documents and draft reports, as well as providing demographic, roadway characteristics, and external traffic data essential for conducting the LRTP update. Three TAC meetings were scheduled periodically throughout the LRTP process to present to the group about the following topics:

1. Kick-off Meeting (December 1, 2016)
2. Existing Conditions (June 15, 2017)
3. Prioritization (November 8, 2017)



Analytic approach uses a balance of input from local experts, data, and models

PUBLIC MEETINGS

Two sets of public meetings were conducted over the course of the LRTP process. First, in May 2017, public meetings were held in each of the counties to discuss the transportation planning process, the goals and objectives, existing conditions and initial forecasts, as well as to introduce the public to the web-based survey. Tablets were also provided for the public to take the survey. The dates and locations of these meetings were:

- Berkeley County: Martinsburg Public Library – May 22, 2017
- Jefferson County: Charles Town Library – May 24, 2017
- Washington County: Washington County Free Library – May 31, 2017

Second, once the LRTP was drafted, the public was provided the opportunity to review this draft document in accordance with federal and state regulations. The public comment period began on January 30, 2018 and concluded on March 1, 2018. The HEPMPO conducted three public meetings for the purpose of providing an overview of Direction 2045, receiving public comments and answering questions. The dates and locations of these meetings were:

- Berkeley County: Martinsburg Public Library – February 15, 2018
- Jefferson County: Charles Town Library – February 20, 2018
- Washington County: Washington County Free Library – February 22, 2018

In accordance with the HEPMPO's Public Participation Plan, both sets of meetings were announced via public notice and social media posting. The draft document was made available on the HEPMPO website. Copies were also made available to the main libraries and the offices of the public transit providers, and the HEPMPO. Details regarding the public comment period, including a copy of the press release, articles from local newspapers, and public comments and responses to those comments can be found in **Appendix B**.

Jefferson County Public Meeting

Berkeley County Public Meeting

PUBLIC SURVEY

During the public meetings, the public, resource agencies identified in Public Participation Plan and key stakeholders were invited to participate in an innovative web-based survey, which was open during the month of May 2017. The HEPMPO web-based survey, as illustrated in **Figure 3-1**, was an online outreach and mapping tool that provided valuable input to the update of the LRTP. The survey consisted of ranking of the LRTP goals, survey questions about each goal, and a mapping section where respondents could place a pin on the map indicating concerns, recommended improvements, or other comments. While the goal was to involve as many area residents and businesses as possible in the planning process, the input received from individuals and organizations provided a unique perspective on the community needs related to transportation, regional priorities, and highway, transit, and pedestrian projects.

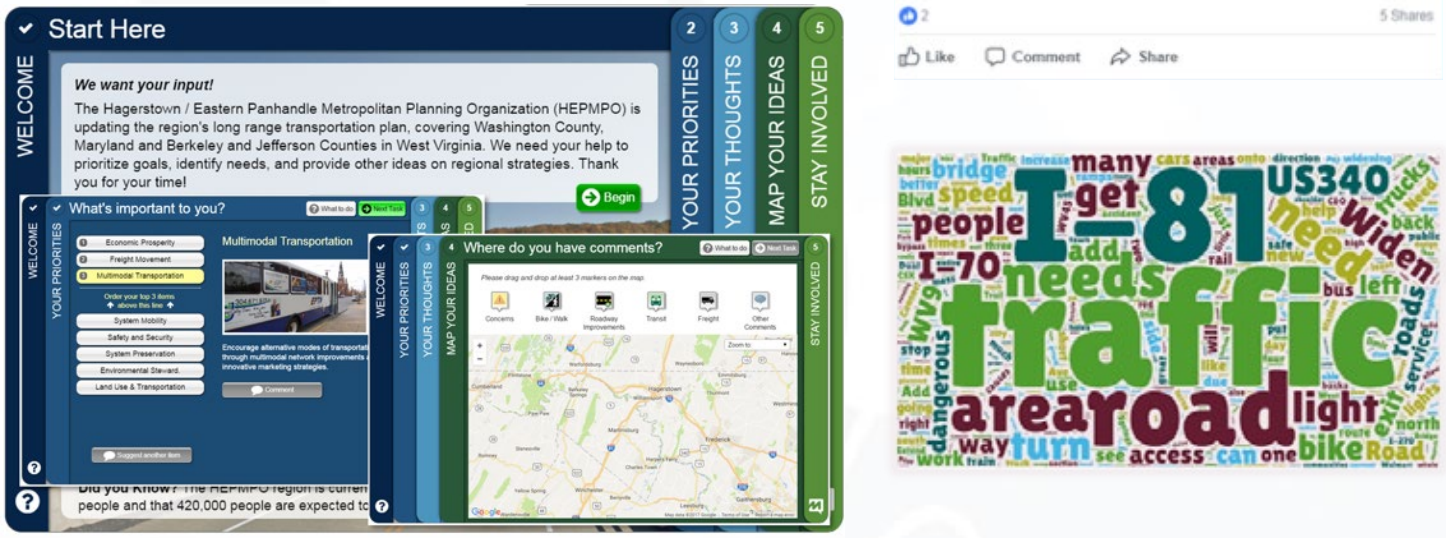


Figure 3-1: HEPMPO Public Outreach Survey and word cloud based on the number of times a word was mentioned

SURVEY RESULTS

During the month that the survey was open to the public, 340 participants provided responses and input to the survey and over 850 map comments were placed on the map survey. The comments were used to identify transportation needs and were integrated into the project selection process and popular topics are shown in the world cloud to the right. Respondents identified their top three priorities, which were based on the plan goals. As shown in **Figure 3-2**, Safety and Security and Economic Prosperity were ranked most frequently. **Figure 3-3** shows the map marker comments and common themes from the comments. (Map markers of Public Comments)

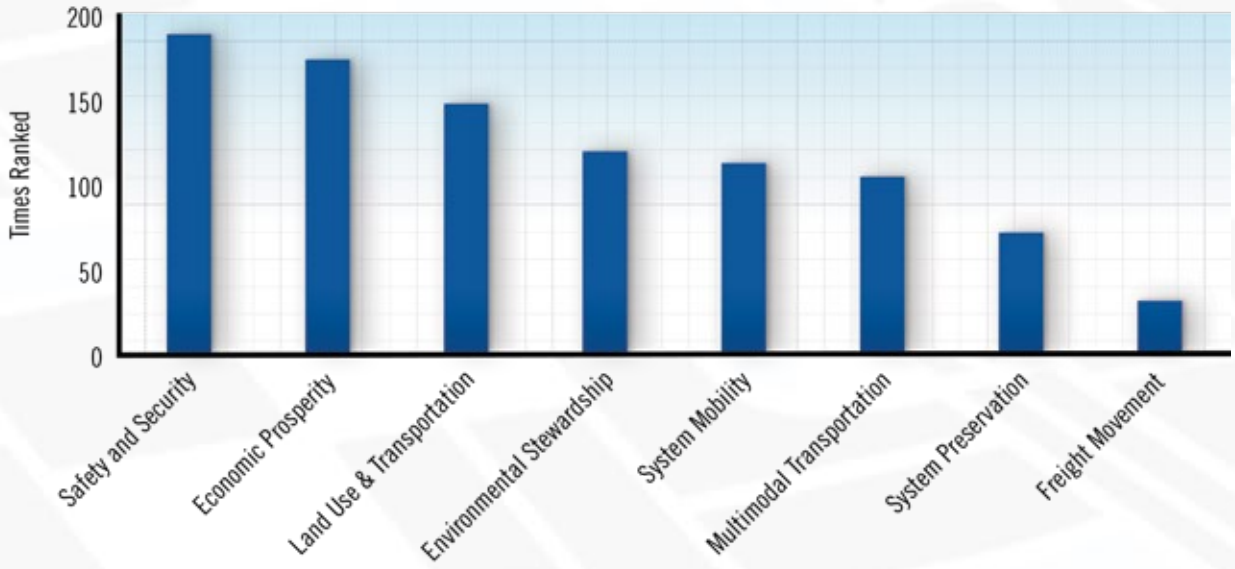


Figure 3-2: Respondents Priorities from Survey

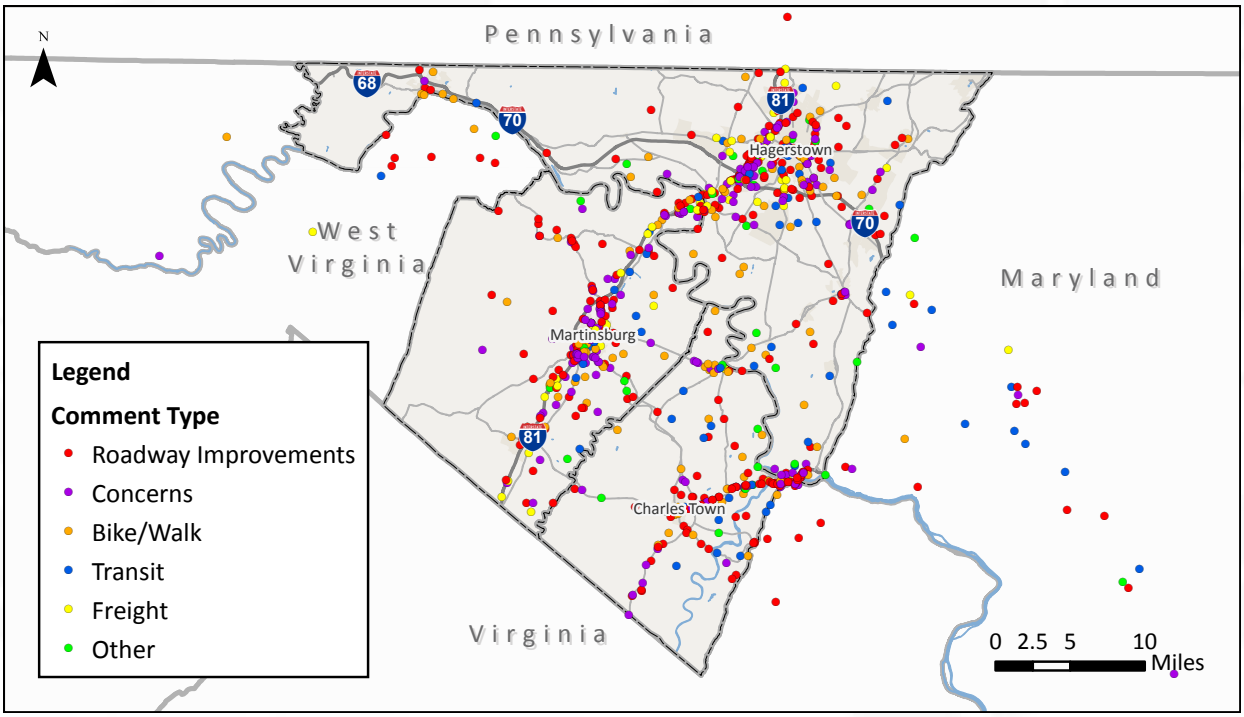


Figure 3-3: Public Comments with Map Marker Locations

A sample of some of the map marker comments include:

ROADWAY IMPROVEMENT COMMENTS

- Widen US340 to prevent bottleneck
- Improve traffic flow along I-81 around the I-70 interchange
- Widen I-81 throughout the region
- Improve WV51 bridge over I-81 Inwood
- Widen WV9 in Hedgesville
- Improve Exit 12 in Martinsburg

CONCERNS AND OTHER COMMENTS

- Improve and add Bike Lanes on WV 45 and Kearneysville Pike in Shepherdstown
- Increase the number of sidewalks
- Improve Byron Bridge Ramp for Bikes in Harpers Ferry
- Improve facilities for cyclists and pedestrians along Dual Highway in Hagerstown

FREIGHT

- Add truck-only lanes along I-81
- Add more lanes along I-81

TRANSIT

- MARC
  - Commuter rail station in downtown Hagerstown with connections to Baltimore, D.C., and/or BWI
  - Additional rail service, especially increased span of service and frequency
- Other Transit
  - Rail alternative to I-70/I270, including DC Metro extension to Frederick
  - Jefferson County weekend excursion between D.C. and Harpers Ferry
  - Sunday service on Washington County Transit (WCT)
  - Weekday evening service to Hagerstown Community College
  - Connection between Hagerstown, Shepherdstown, and Jefferson County
  - Weekday evening service on EPTA

Additional details of the survey are included in the Public Involvement, **Appendix B**.

ENVIRONMENTAL JUSTICE

As a recipient of federal funds, the HEPMPO must consider Environmental Justice issues with specific regard as to whether or not potentially disadvantaged populations would experience disproportionately high and/or adverse impacts from transportation projects, as well as whether or not these populations would have the opportunity to share equally in the benefits stemming from transportation projects. EJ in transportation plans, such as **Direction 2045**, is achieved through:

- avoiding, minimizing, or mitigating disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations.
- ensuring full and fair participation in the transportation decision-making process by all potentially affected communities.
- preventing the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Furthermore, the HEPMPO has recently completed a Title VI plan, which analyzed Environmental Justice Populations. While the Title VI plan illustrated that HEPMPO was adequately providing services to these populations, the HEPMPO specifically sought out public input from these populations through a series of intercept surveys, which are surveys conducted in-person at businesses or public places. The survey was similar to the web-based survey but also included questions about access to vehicles, transit, and bicycle/pedestrian conditions. The intercept survey locations were picked due to high transit use and likelihood of Environmental Justice population presence. The dates and locations of the intercept surveys are shown in **Table 3-1**:

Table 3-1: HEPMPO Intercept Survey Locations

County	City	Location	Date
Washington	Hagerstown	Wal-Mart	June 30, 2017
Washington	Hagerstown	WCT Bus Transfer Station	June 30, 2017
Washington	Hagerstown	Washington County Free Library	June 30, 2017
Berkeley	Martinsburg	Wal-Mart	June 30, 2017
Berkeley	Martinsburg	Caperton Train Station	June 29, 2017
Berkeley	Martinsburg	Martinsburg-Berkeley County Public Library	June 30, 2017
Jefferson	Charles Town	Wal-Mart	June 30, 2017
Jefferson	Charles Town	Charles Town Library	June 30, 2017

The intercept survey had 175 respondents and almost 200 map marker comments. Over 55% of respondents were non-white, 75% of respondents had household incomes of less than $35,000, and over half have a primary mode of transportation of other than personal car. Additional details of the intercept survey are included in the Public Involvement, **Appendix B**.

CHAPTER FOUR
HIGHWAY NEEDS ASSESSMENT

The Highway Needs Assessment serves several important roles in HEPMPO's planning process:

- Identify locations for future transportation projects or studies
- Provide measures to monitor performance of the transportation system
- Identify data and measures for project prioritization

This chapter provides an assessment of highway needs with respect to traffic congestion and system (bridge and pavement) management. Safety needs are addressed separately in **Chapter 8**.

For the highway needs assessment, performance measures have been developed using available information from national, state DOT, and private sources. The measures have been used to identify transportation needs and recent traffic trends, to establish important baseline performance values to support future monitoring and tracking, to assist in the prioritization of transportation projects for the financial constraint portion of the plan, and to identify un-funded priorities. **Chapter 9** provides additional information on performance management including USDOT's required measures for monitoring system performance, safety and asset conditions.

TRAVEL LEVELS AND TRENDS

As part of the Highway Performance Monitoring System (HPMS), both the Maryland Department of Transportation (MDOT) and West Virginia Department of Transportation (WVDOT) produce estimates of daily vehicle miles traveled (VMT) by county and roadway type. As part of the performance-based planning process, VMT serves as an important measure for tracking vehicular travel since it is summarized annually by each DOT. In many states, VMT has been emphasized as a key measure since it reflects overall travel mobility incorporating the impacts of land use and multi-modal (e.g. transit, bicycle, pedestrian) usage.

In 2015, Washington County had the highest average daily VMT in the HEPMPO region at 5.5 million followed by Berkeley County (3.0 million) and Jefferson County (1.4 million). The regional VMT is impacted by through volume on the freeways, as well as land use and demographic growth in each county. Interstate travel (I-81 and I-70) accounts for 52% of the VMT in Berkeley County and 50% of the VMT in Washington County. Interstates do not run through Jefferson County.

Since 2000, Berkeley County has experienced a 30% increase in VMT, with nearly 60% of that growth occurring on I-81 in West Virginia. Jefferson County has had the highest VMT growth rate in the region attributed to a steady population and employment growth. In contrast, Washington County has had a relatively low VMT growth rate of 10% over the 15-year period. About 40% of that growth occurred on I-81 and I-70. Figure 4-1 provides the changes in annual VMT for each of the counties in the region.

Figure 4-2 provides 2000-2015 HPMS VMT trends in comparison to population and employment growth over the same time period. As illustrated in the graphs, the historic VMT growth is generally correlated to the growth in population and employment in all three counties. Other factors including the down-turn of the economy and rising fuel costs impacted VMT between 2009 and 2012. Since 2012, significant VMT growth has occurred in Berkeley and Jefferson Counties in West Virginia.

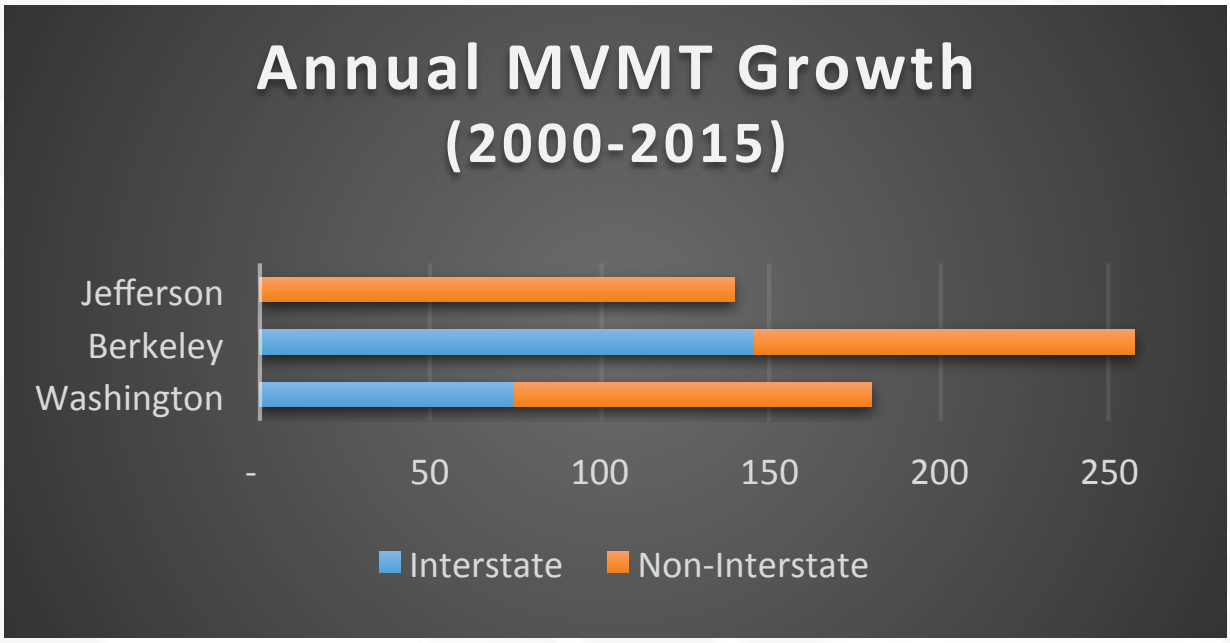


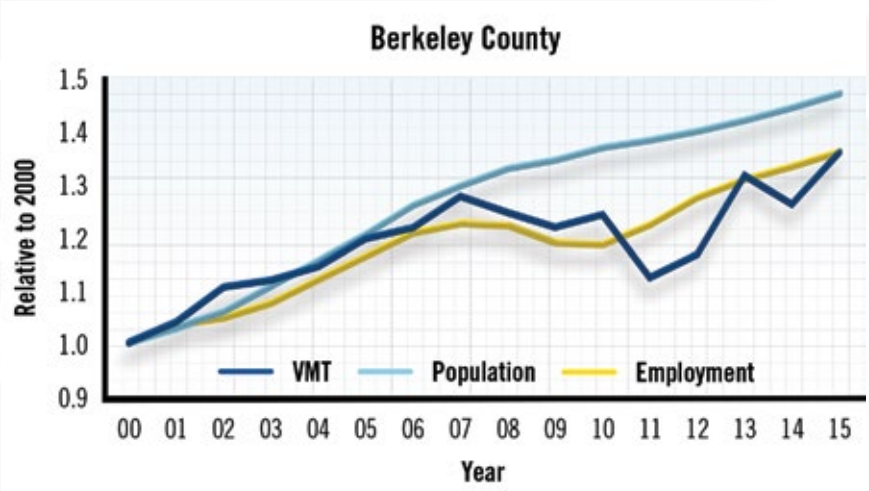
Figure 4-1: Total Millions of Vehicle Miles of Travel (MVMT) Growth by County from 2000-2015

I-81 carries traffic volumes as high as 86,000 vehicles (24,000 trucks) per day in Washington County.

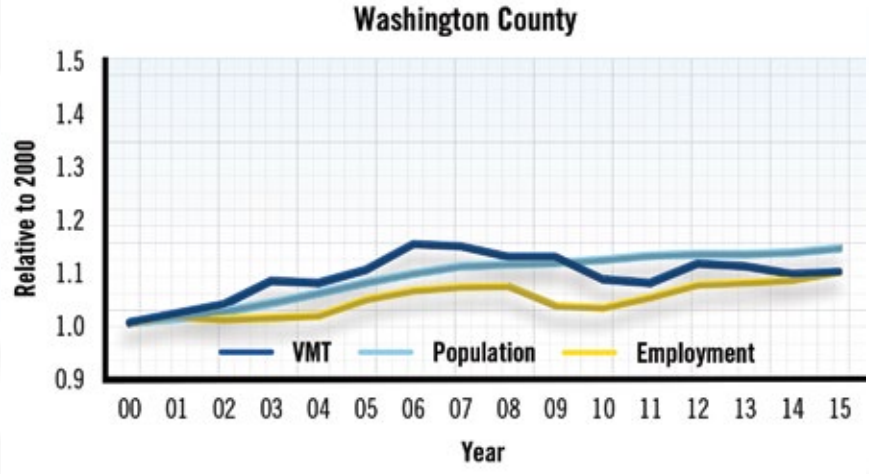
Traffic volume depicts the amount of vehicles using a roadway. Volumes are typically reported as average annual daily traffic (AADT), which represents an average day over the course of a year. The traffic volume map, illustrated by **Figure 4-3**, summarizes the AADT on roadways within the HEPMPO region based on traffic counts conducted by MDOT and WVDOT. As expected, the interstates have the highest traffic volumes among roadways in the region. The entire length of I-81, as well as the majority of I-70, from the Frederick County border to Hancock, has average traffic volumes greater than 50,000 vehicles per day. US 40 in southeast Hagerstown, US 340 in Jefferson County, MD 65 in southern Hagerstown and WV 9 in Berkeley County and Jefferson County, also have high traffic volumes, carrying between 20,000 and 40,000 vehicles per day.

I-81 is one of the east coast's greatest transportation assets, beginning in Dandridge, Tennessee and terminating at the Canadian border at Wellesley Island, New York and is recognized for its ability to move freight north and south in the eastern United States. The interstate's value to the movement of goods was recognized by FHWA when it placed I-81 on the National Highway Freight Network. The HEPMPO will continue to monitor traffic volumes along this corridor of national, regional and local significance. In Maryland, I-81 averages about 71,300 AADT with truck volumes accounting for 27% of all traffic. Portions of I-81 near Halfway Boulevard exceed those numbers. In West Virginia, a continuous weigh traffic count station is located 1.5 miles south of Exit 12. In 2016, the station reported an AADT of just over 55,000 with 22% trucks. These traffic and truck volumes represent a 16% increase over the volumes reported in 2010.

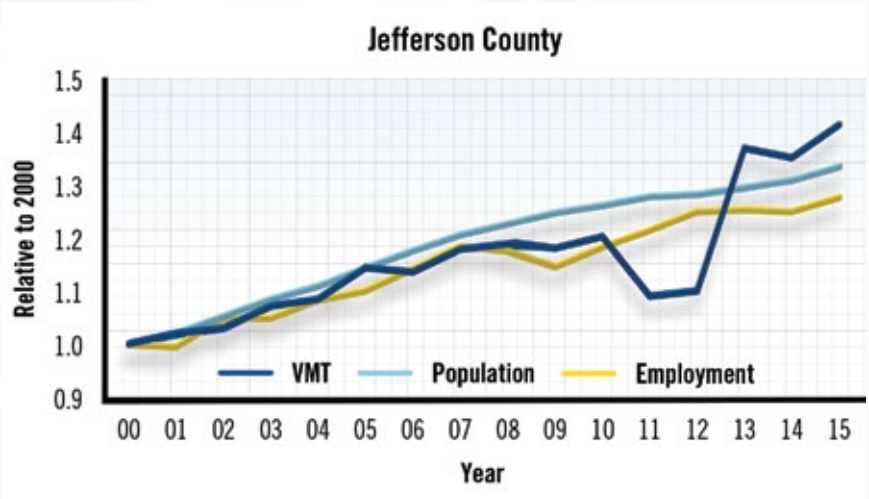
2015 Daily VMT = 5.5 Million



2015 Daily VMT = 3.0 Million



2015 Daily VMT = 1.4 Million



Figures 4-2: County Historic VMT Trends (2000-2015)

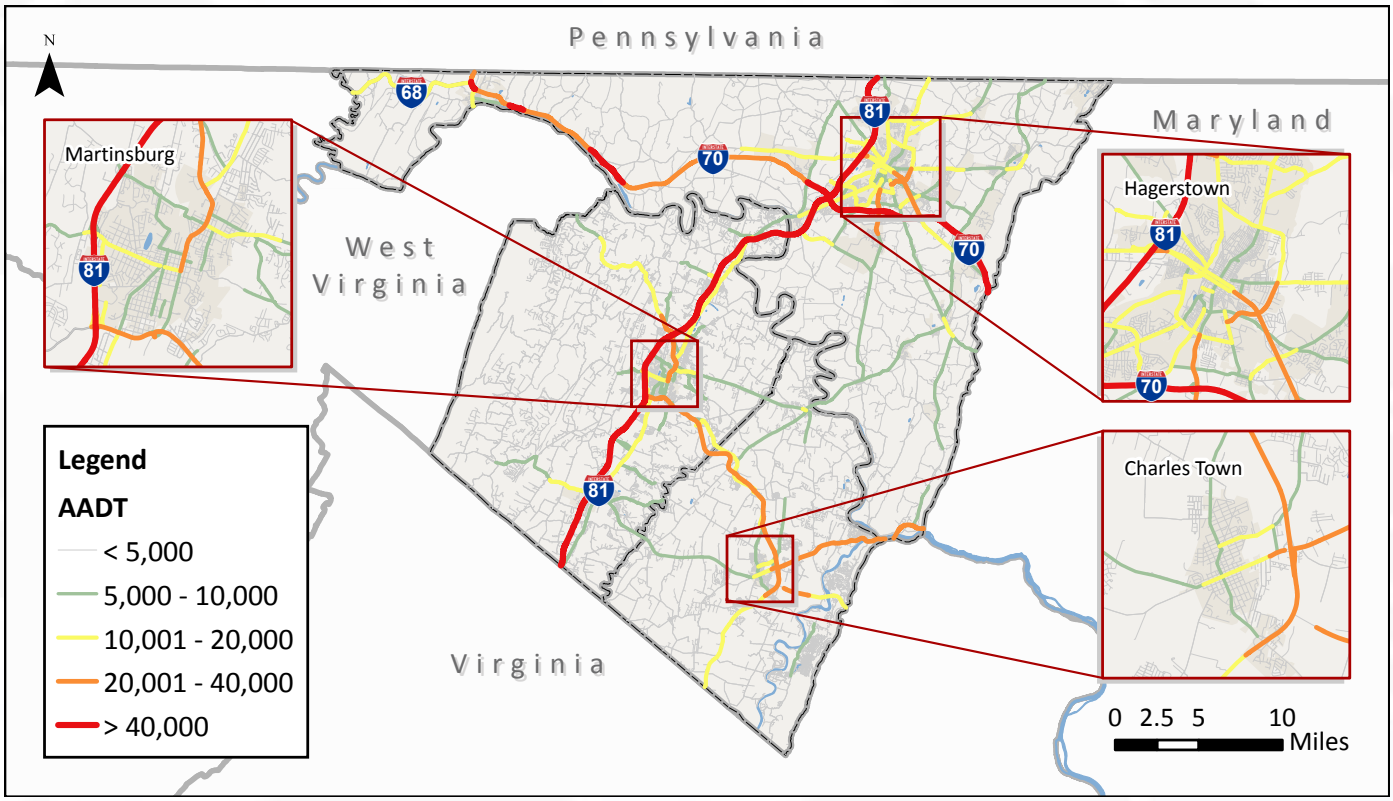


Figure 4-3: 2015 Average Annual Daily Traffic Volumes

TRAVEL ORIGINS AND DESTINATIONS

To support the LRTP and other HEPMPO planning activities, an origin-destination assessment was completed using vehicle location information from StreetLight Data, Inc. StreetLight provides information on vehicle mobility patterns based on global positioning system (GPS) and cellular mobile devices. The data have been used to examine origins and destinations of travelers at HEPMPO border locations and along proposed roadway project locations throughout the region. To date, the data have been used to update the regional travel demand model and to support the evaluation of vehicle diversions related to new alignment projects.

Nearly 50% of the vehicles on the interstates (I-81 and I-70) travel through the region based on available GPS data.

Figure 4-4a and b illustrates the locations where origin and destination assessments have been conducted. For the border locations, the range of pass-through traffic (the portion traveling through the HEPMPO 3-county region) has been categorized. The graphic illusrtates that over 50% of the traffic on I-81 is passing through the region. High pass through percentages also exist for I-70 and US 340. **Figure 4-5** provides an example of an origin and destination summary prepared for the addendum report referenced above. Graphical assessments are provided on the key origin and destination zones for vehicles using I-81. In these reports the internal and pass-through percentages refer to the county for which the analysis segment is located.

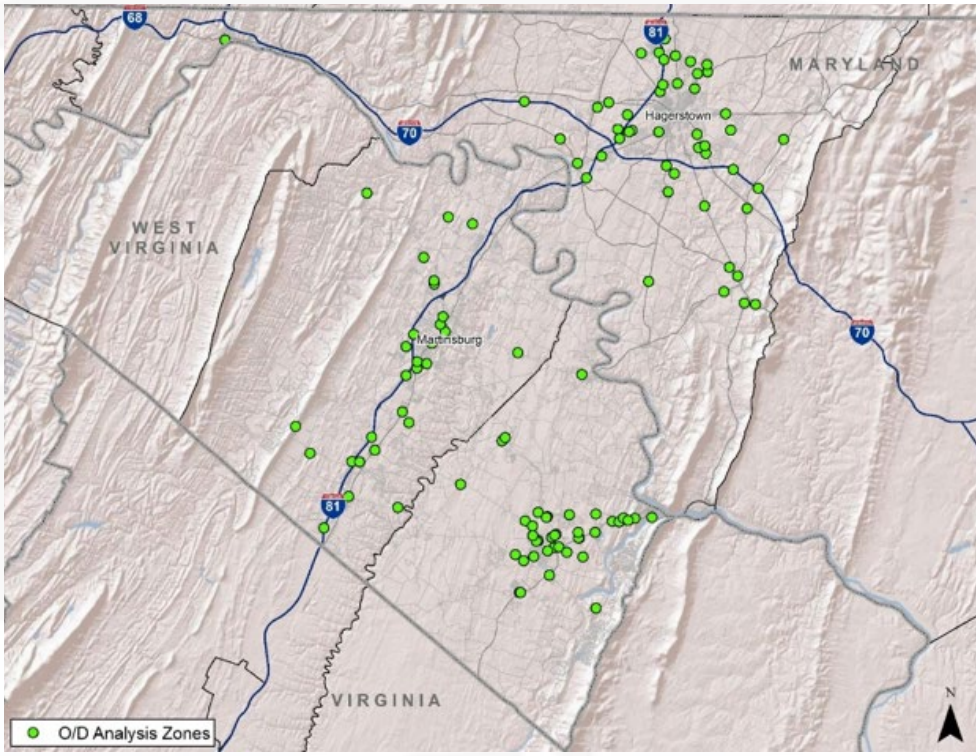


Figure 4-4(a): Locations of Origin Destination Assessment within HEPMPO Region

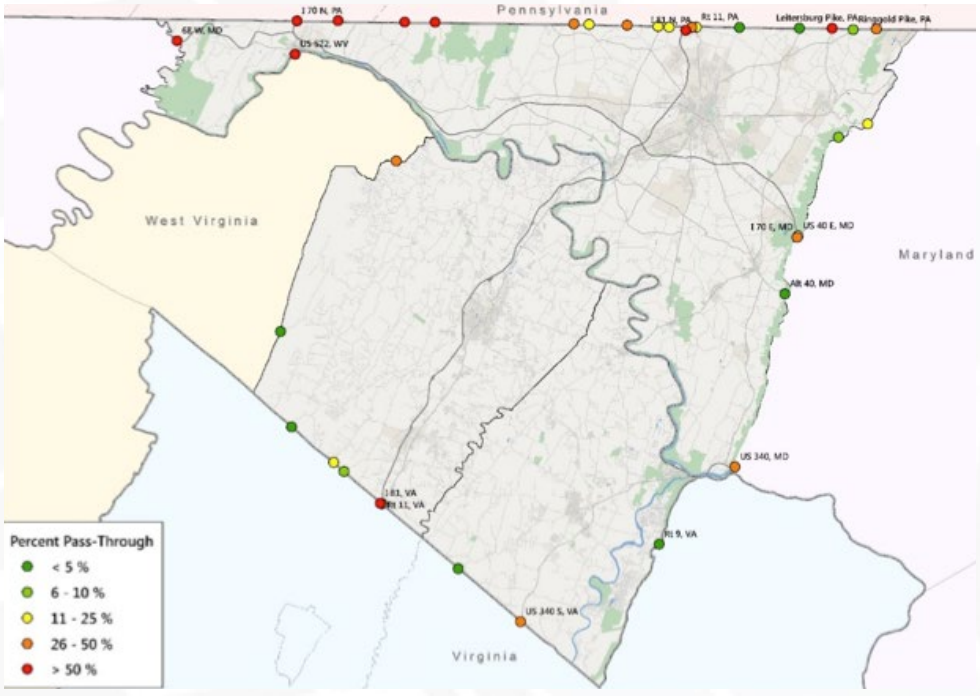
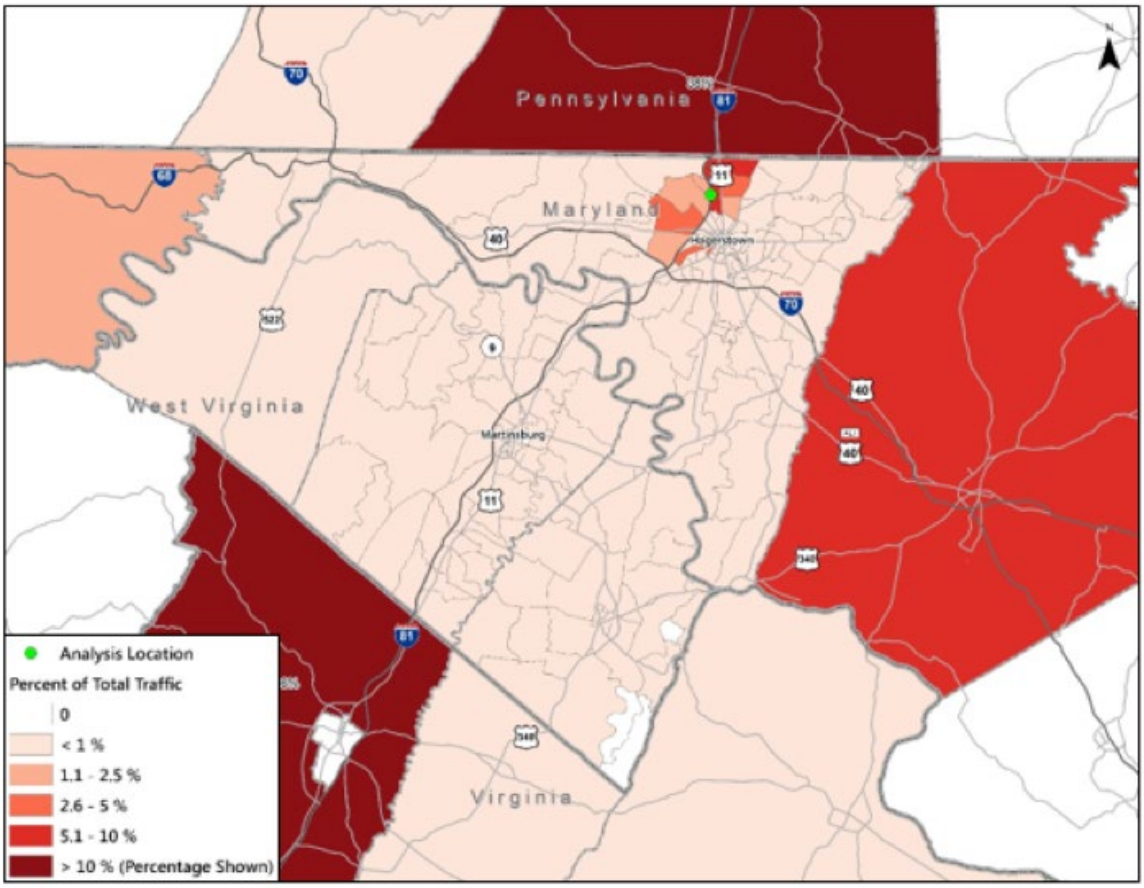


Figure 4-4(b): Border Locations of Origin Destination Assessment



Traffic Type	Percent
Internal	16.0%
Pass-Through	54.1%
Inter-County	29.9%

Traffic Type		Percent
Origin	Destination	
Franklin, PA	Frederick, VA	16.7%
Frederick, VA	Franklin, PA	16.1%
Washington, MD	Washington, MD	16.0%
Franklin, PA	Washington, MD	11.6%
Washington, MD	Franklin, PA	10.9%

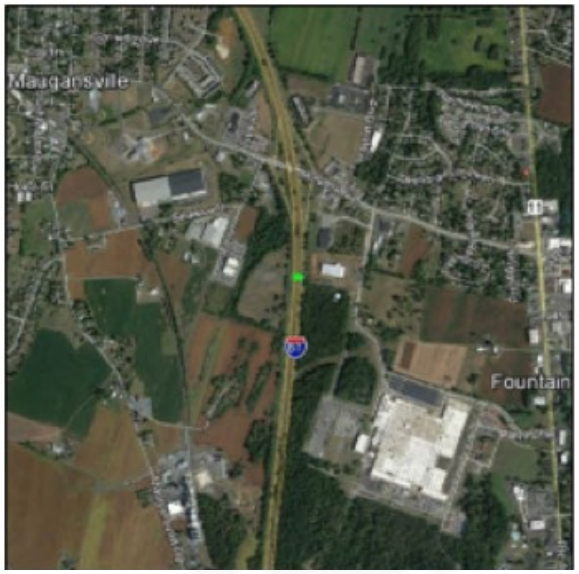


Figure 4-5: Example Origin Destination Assessment at Locations within HEPMPO Region (Interstate 81 – South of Maugans Avenue Interchange)

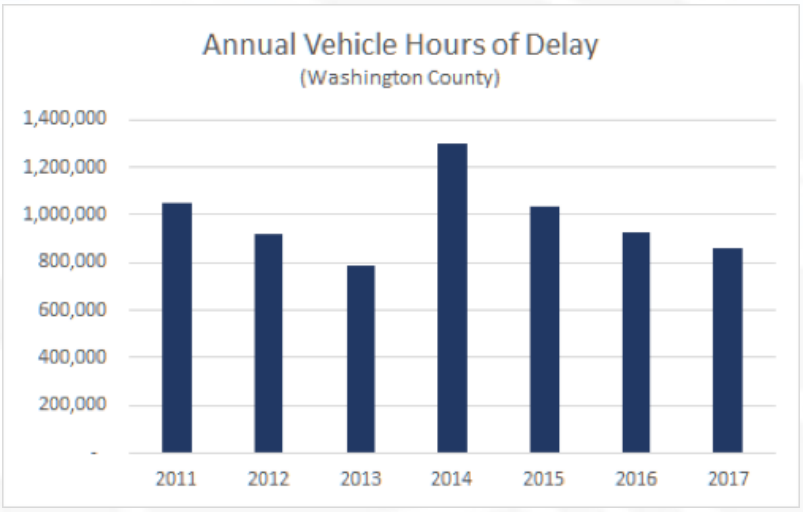
TRAFFIC CONGESTION

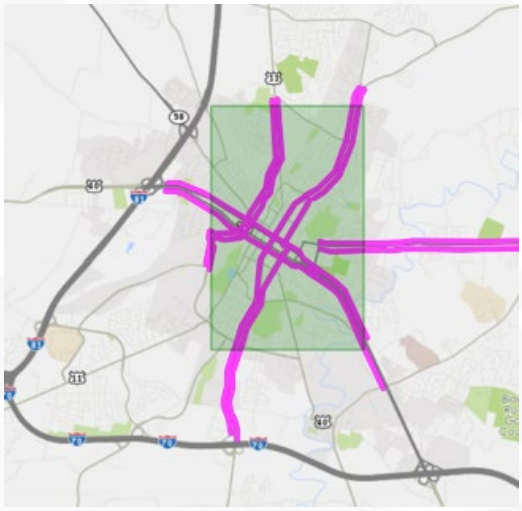
Performance measures for traffic congestion have been prepared for each county and for individual roadway segments within the HEPMPO region. Regional measures are useful for monitoring traffic congestion and progress towards meeting defined targets that will be established in the future by each DOT as part of the MAP-21 and FAST Act requirements. These regional measures including interstate and non-interstate reliability, freight reliability, and peak hour excessive delay are addressed in **Chapter 9**, which focuses on the monitoring of transportation performance. Roadway specific measures are used to assess highway capacity needs within the region, providing important insights for the identification and prioritization of transportation projects.

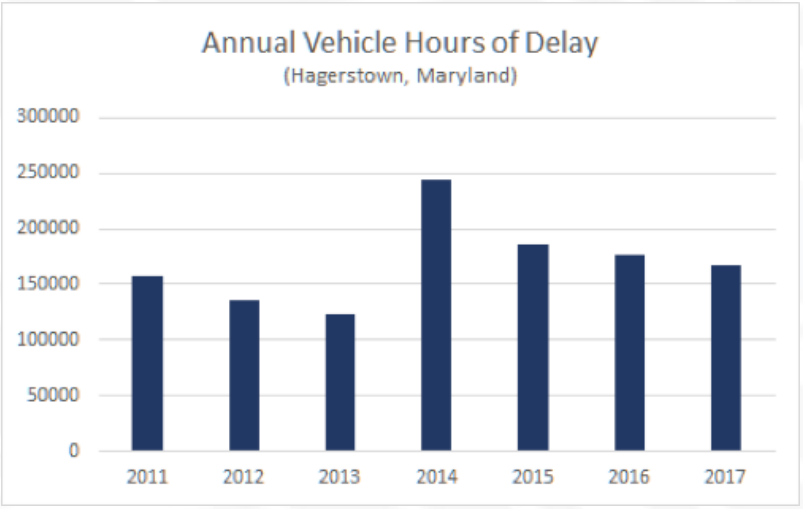
Historical travel time data is available from multiple sources including INRIX, NPMRDS and TomTom.

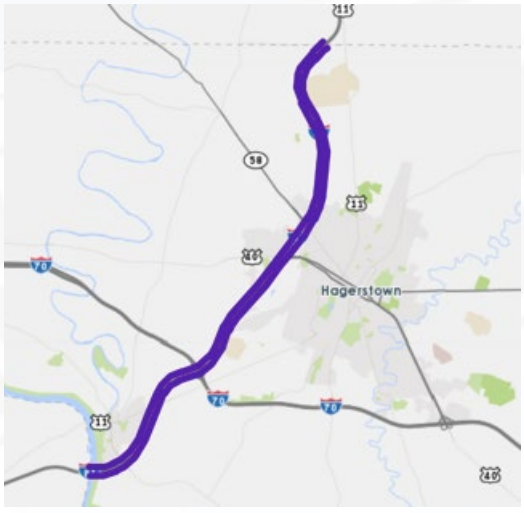
As used for past planning in the region, GPS travel time data have been acquired and analyzed to identify key areas of traffic congestion. INRIX historical travel time data from 2011 through 2017 are available for download through the University of Maryland's Regional Integrated Transportation Information System (RITIS). The data are available for roads on the National Highway System (NHS). RITIS is an automated data sharing, dissemination, and archiving system that includes many performance measure, dashboard, and visual analytics tools that help agencies measure performance and communicate information between agencies and to the public. Currently, INRIX travel time data for West Virginia is not available within RITIS. **Figures 4-6** summarizes historical delay totals for NHS roadway segments in Washington County using the 2011-2017 INRIX travel times. 2017 annual estimates have been extrapolated from January through November data. The data trends vary by selected roadways but generally indicate higher delay totals over the last four years as compared to the timeframe for the last HEPMPO LRTP.

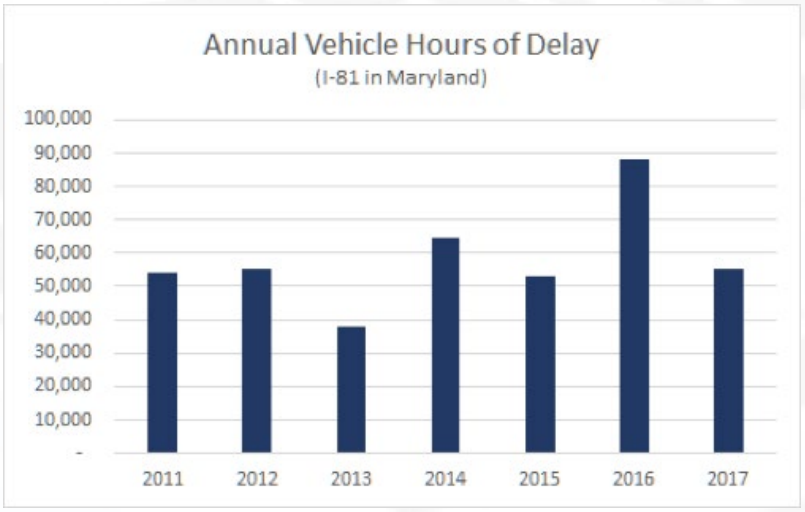
Traffic along I-81 in Hagerstown, MD



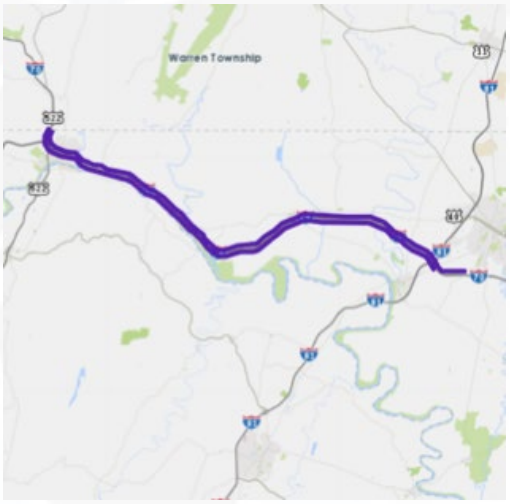


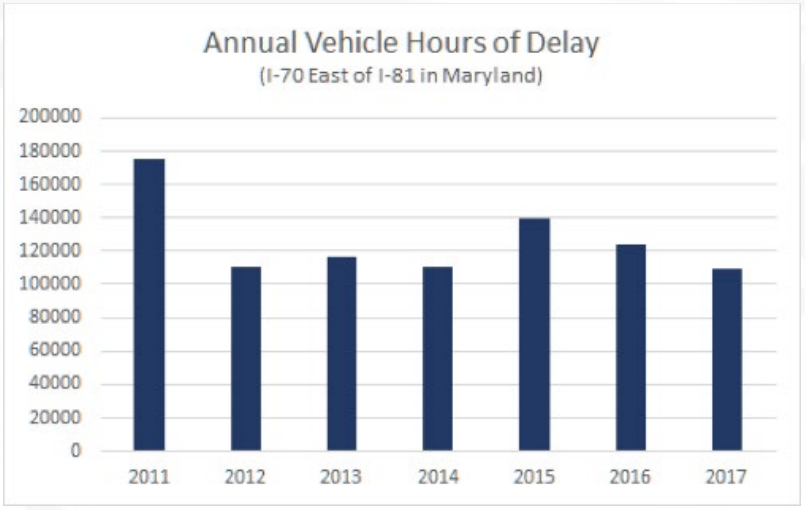


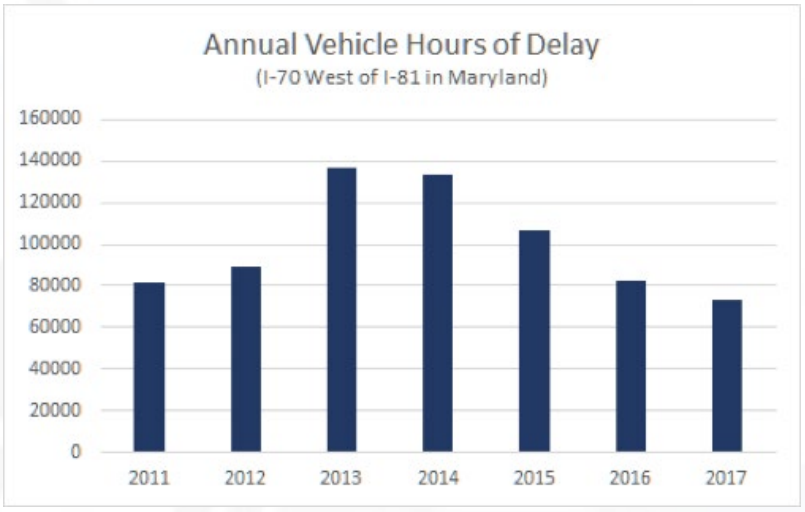


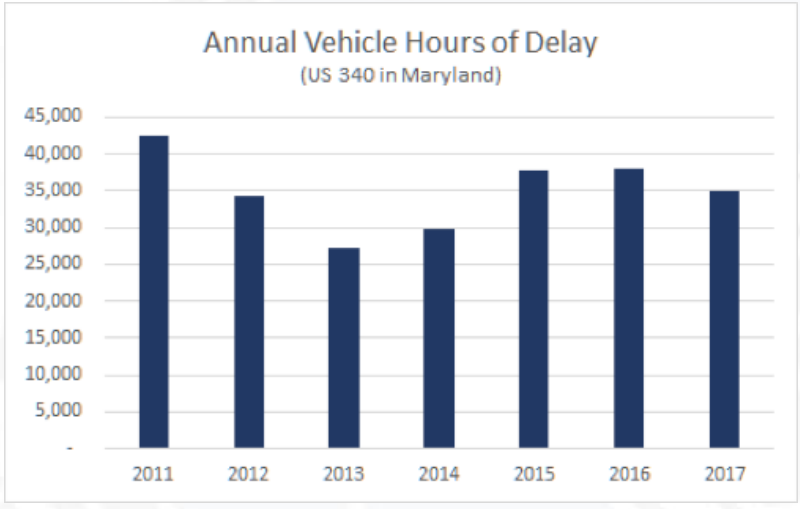


Figures 4-6: Annual Vehicle Hours of Delay (INRIX) – Washington County Roadways









Figures 4-6: Annual Vehicle Hours of Delay (INRIX) – Washington County Roadways (continued)

I-81 has received a significant amount of attention in the region regarding traffic congestion and safety. However, the INRIX data indicate less delay on I-81 as compared to other regional freeways and roadways, including I-70. A sampling of I-81 daily delay fluctuations is illustrated in **Figure 4-7**. The figure highlights the impacts of recent incidents on traffic congestion along this corridor. This non-recurring delay (e.g. unexpected delay) has a significant impact on traveler perceptions and regional freight movements. The HEPMPO will continue to monitor INRIX delay trends for available roadway segments. In future years, it anticipated that more information will be available for roadways in West Virginia.

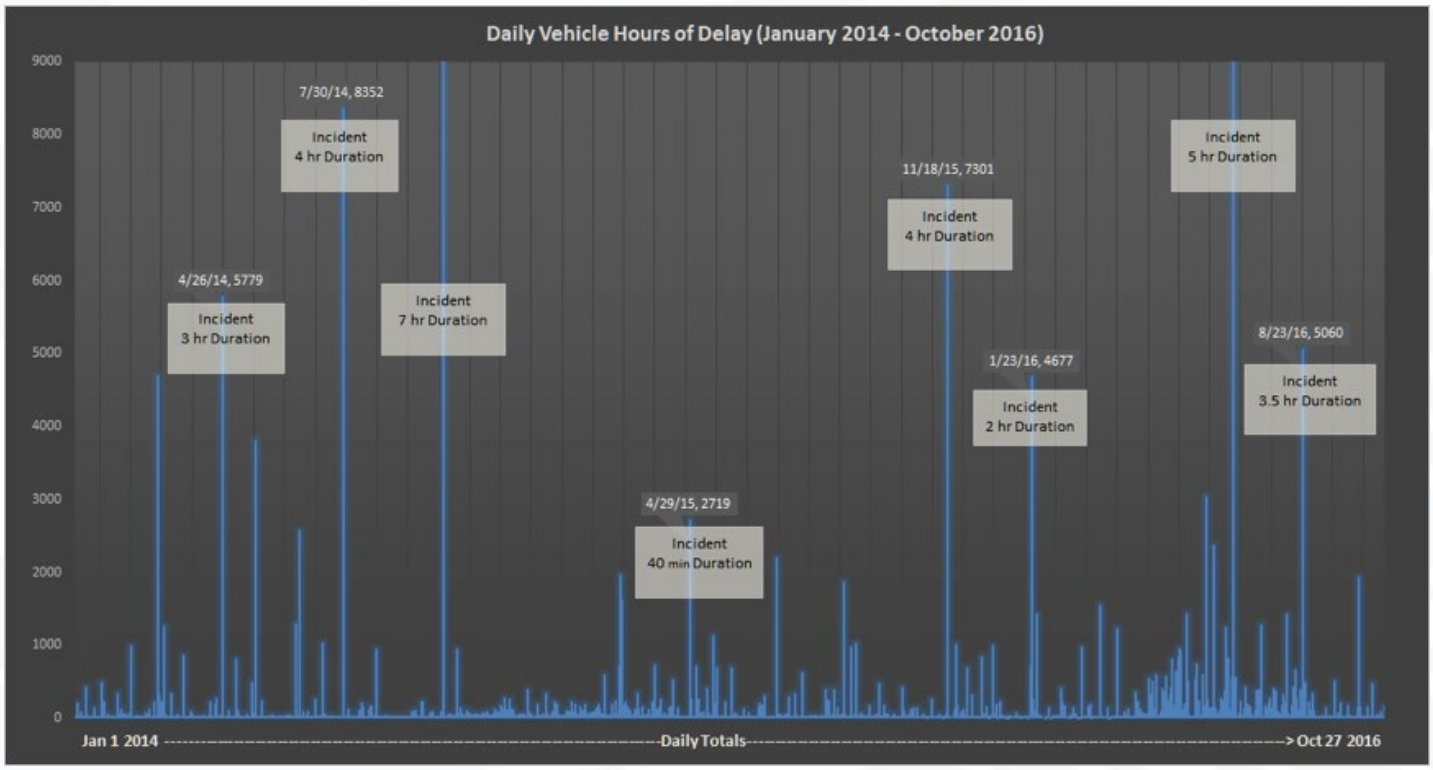


Figure 4-7: Daily Vehicle Hours of Delay on I-81 in Maryland

RITIS also provides access to travel times for the National Performance Management Research Data Set (NPMRDS), which is used to support the calculation of the federal performance measures presented in **Chapter 8**. The latest version of the NPMRDS only includes travel time records for the NHS from February 2017 onward. Thus, there are limited historical data from that source. The dataset includes nationwide NHS coverage; however, the NHS in West Virginia only includes I-81, WV 9 (from Virginia to Morgan County, WV), and US 340.

To supplement the above data sources and to provide a more comprehensive assessment of traffic congestion for NHS and non-NHS roadways for both Maryland and West Virginia counties, the HEPMPO has obtained TomTom GPS average weekday and weekend travel times representing the 2014-2016 time period. The TomTom GPS data has been acquired and processed in a similar manner as used for the last LRTP update, which utilized travel times averaged over the 2010-2012 time period. The data complements the regional analyses by measuring "real travel times," potentially identifying operational impediments such as deficient intersection capacity or access management issues. The GPS data includes travel times for peak and off-peak conditions within the region.

A travel time index (TTI) was estimated for each roadway segment based on the TomTom data. TTI is estimated by taking the peak period travel time divided by the off-peak (e.g. typically night time) travel time. Typically values of 1.25 (e.g. 25% higher travel times in peak vs. off-peak) or higher represent traffic congestion. **Figure 4-7** provides summary maps illustrating congested TTI values across the region. The values from the latest data set (2014-2016) were compared to that acquired for the previous LRTP (2010-2012).

Travel Time Index (TTI) values have been calculated from TomTom GPS data to illustrate congested roadways in the region.

The TomTom data provided insights into the locations of existing traffic congestion and approximate levels of vehicle queuing. The TTI data were used to evaluate recommendations for new transportation improvements and were directly utilized within the project prioritization process. Projects that addressed locations of high traffic congestion (e.g. higher TTI index) received higher values for that project scoring component.

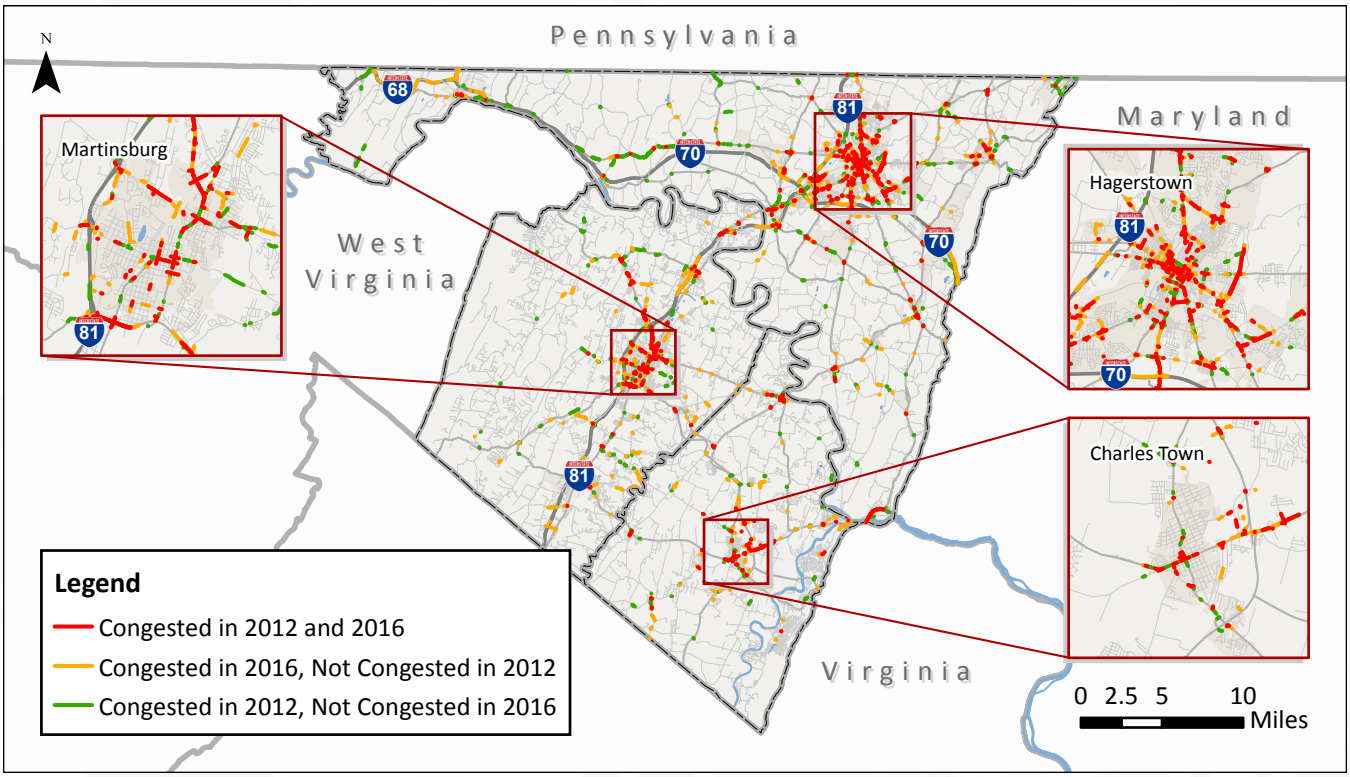


Figure 4-8: Travel Time Index (TTI) Assessment for Region

Table 4-1 summarizes key locations of existing congestion from the analysis of the GPS data. The data corroborate many of the public and stakeholder comments on transportation needs within the region.

Table 4-1: Key Locations of Existing Traffic Congestion for Region

County	Facility	From	To
Washington	I-70	Exit 32 (US 40)	I-81
	I-81	Exit 9	I-70
	Eastern Boulevard	US 40	North of MD 64
	US 11	Prospect Street	Maugans Avenue
	Maugans Avenue	I-81	US 11
	Northern Avenue	US 11	MD 60
	Edgewood/Robinwood Drive	US 40	MD 64
	MD 65	Oak Ridge Drive	Poffenberger Road
Berkeley	I-81	Exit 8	Exit 12
	WV 45 (Apple Harvest)	I-81	Queen Street
	WV 9	Hedgesville	WV 45
	Spring Mills Road	I-81	US 11
	US 11	South of Inwood	North of WV 51
Jefferson	US 340	Harpers Ferry Bridge	WV 9
	WV 45	Mill Street	Potomac Farms Drive
	WV 51	Co Route 13	WV 9

PUBLIC INPUT ON TRAFFIC NEEDS

A web-based public outreach effort was conducted during the plan development. Through an interactive website, users provided input and spatial comments on transportation needs throughout the region as illustrated in **Figure 4-9**. Many of these needs were combined with available GPS data and other stakeholder input to identify a financially un-constrained project list. Key locations noted for highway improvement projects included US340, I-81 & I-70, WV 51 at Inwood, WV 9 in Hedgesville, MD 65 South of Hagerstown, and Exit 12 in Martinsburg.

Public outreach included the collection of specific highway needs and recommended improvement locations.

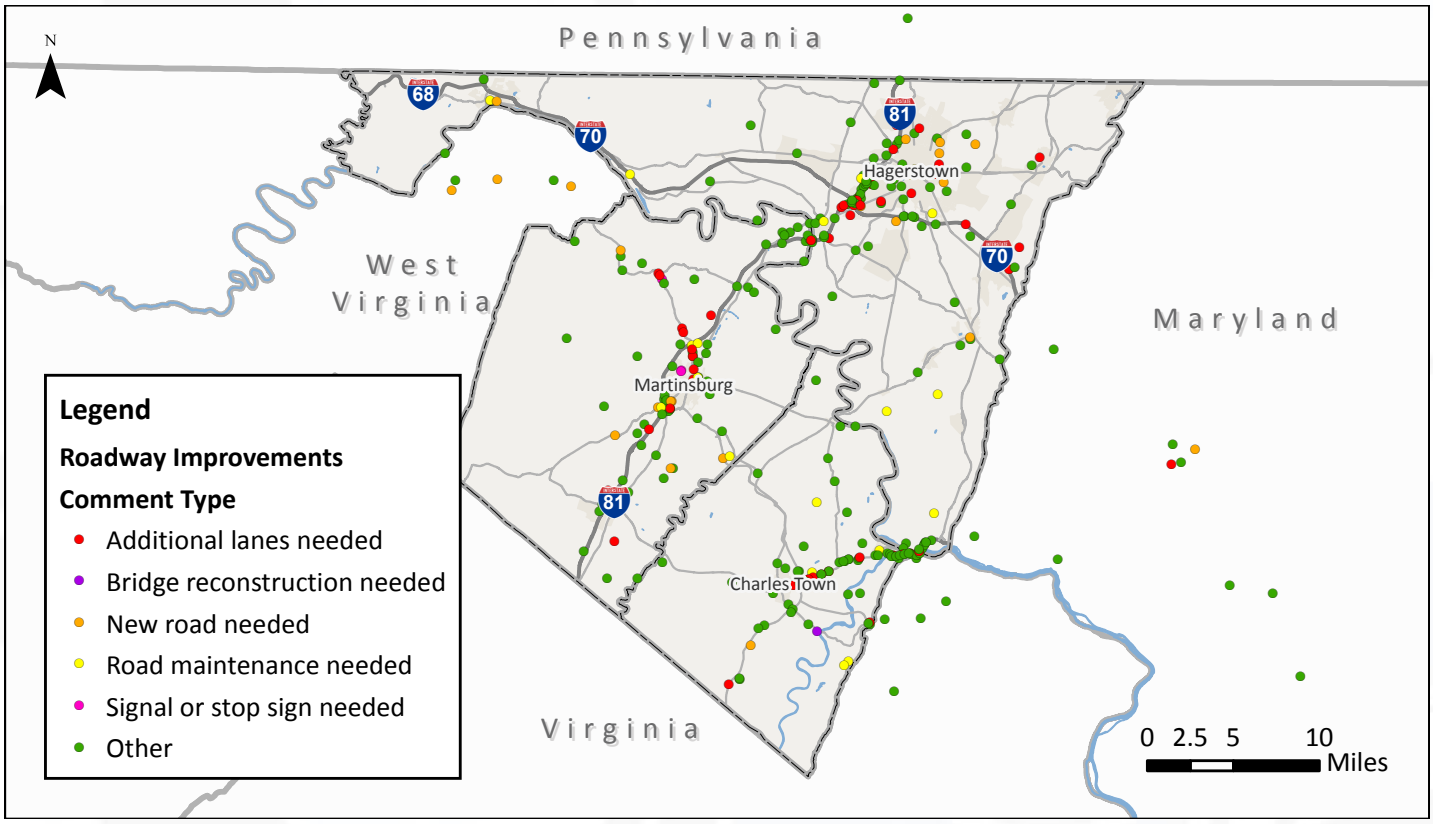


Figure 4-9: Public Spatial Comments Received During LRTP Web-based Outreach

TRAFFIC FORECASTS

HEPMPO's regional travel demand model provides estimates of future traffic growth related to the socioeconomic (household and employment) forecasts presented in **Chapter 2**. The growth of vehicle trips by defined traffic analysis zones was used as quantitative criteria to prioritize transportation projects. The travel model was also used to evaluate and test the impacts of identified transportation projects (both as a group and individually) on vehicle miles of travel and travel delay. These model results were integrated into project prioritization and a summary on the plan performance as documented in **Chapter 9**.

The regional travel demand model provides relationships between households, employment and travel; estimates diversions related to transportation investments including new roadway construction and capacity-enhancing projects; and, estimates the impact of congestion on regional trip making behavior and route choices.

The regional travel model provides data to support project prioritization and to evaluate plan performance.

It is important to note that the travel modeling process is a "planning-level" assessment. Although individual links of the highway network are analyzed, the travel model does not explicitly model every intersection or specific details regarding intersection control, such as traffic signals and their timing. The model is a traditional three-step process incorporating trip generation, trip distribution, and traffic assignment. Trips are generated across nearly 500 traffic analysis zones (TAZs) and are loaded onto the roadway network using generalized links that represent the local roadway system.

The regional travel model was originally developed for the 2005 LRTP and encompasses Washington County in Maryland, as well as Jefferson and Berkeley Counties in West Virginia. The HEPMPO has maintained and upgraded the travel model to expand its ability to address regional and county-level studies. For this LRTP, the regional model has been updated to include new validation statistics based on recent traffic count data, an enhanced network and zone structure, the development of 2015 base year data inputs; and the integration of Streetlight GPS data on external origins and destinations. In addition, forecasts of households and employment have been allocated to the travel model zone structure within each county using the latest information from county planning and economic development staff. A description of these updates is provided in a separate model validation document at the HEPMPO website.

Figure 4-10 illustrates the travel model forecast growth trends for trips and roadway traffic volumes. The results are presented assuming only the inclusion of existing-plus-committed (E+C) projects with funds committed for construction. Analyzing the E+C roadway network depicts the worst-case scenario utilizing 2045 projected land use to forecast the deficiencies that would result if no additional projects were constructed beyond those currently committed. Some of the future congested corridors locations are summarized in **Table 4-2**.

Figure 4-10: Forecasted Zonal Trip and Roadway Traffic Volume Growth (2015-2045)

Table 4-2: Key Locations of Traffic Volume and Delay Growth for Region

County	Facility	From	To
Washington	I-70	Frederick County	I-81
	US 40	I-81	Hagerstown
	Eastern Boulevard	US 40	North of MD 64
Berkeley	I-81	Exit 8	Exit 12
	WV 51 (Inwood)	I-81	US 11
	WV 9	Hedgesville	WV 45
	US 11	Falling Waters	Hainesville
Jefferson	US 340	Harpers Ferry Bridge	WV 9
	WV 9	US 340	Virginia
	WV 51	Co Route 13	WV 9

HIGHWAY PAVEMENT AND BRIDGE MANAGEMENT

Asset management is a strategic and systematic process of operating, maintaining, and improving physical assets. These assets include the roadway pavement and bridges. The management process for maintaining the highway assets includes a structured sequence of maintenance, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practicable cost.

On October 24, 2016 (effective October 2, 2017) the USDOT issued a final rule (FR 81 73196) to address the new requirements established by MAP–21. The rule includes the following requirements:

- Requires states to develop and implement risk-based asset management plans for the National Highway System (NHS) to improve or preserve the condition of the assets and the performance of the system.
- Requires FHWA to establish minimum standards for states to use in developing and operating bridge and pavement management systems.
- Mandates periodic evaluations to determine if reasonable alternatives exist to roads, highways, or bridges that repeatedly require repair and reconstruction activities.

The rule establishes requirements applicable to states in each of these areas. The rule also reflects the passage of the FAST Act, which added provisions on critical infrastructure to the asset management requirements. The USDOT finalized additional rulemaking on January 18, 2017 (FR 82 5886) to establish performance measures for state DOTs to use to assess the condition of pavements and bridges on the NHS. These performance measures are discussed in more detail in **Chapter 8**.

State DOTs are in the process of developing asset management plans and performance measure targets for pavement and bridge conditions.

The asset management plans and performance measures will be developed and implemented by the state DOT. Within the HEPMPO region, the majority of the system mileage addressed through the regional transportation plan is under the jurisdiction of MDOT and WVDOT. Management plans will include strategies that lead to a program of projects that would make progress toward achievement of state targets for asset condition and performance of the NHS. States must address pavements and bridges but are encouraged to include all infrastructure assets within the highway right-of-way in their risk-based asset management plan. To date, neither the WVDOT or MDOT have finalized asset management plans. HEPMPO will continue to monitor these efforts and upon their completion work to:

- Incorporate state DOT asset management goals, practices, and objectives into the MPO planning process.
- Include condition monitoring reporting and data into the HEPMPO's long range transportation plan.
- Coordinate with state DOTs on asset management needs and targets.
- Identify long-range asset investment needs to meet asset condition targets.
- Support project selection and investment policies that support asset management.
- Educate the public and MPO board members on asset management and needs.

The planning process always emphasized close coordination between state DOTs, MPOs, and transit providers. However, the management of major asset conditions, such as Interstate or NHS roads and bridges, was often assumed to be the purview of the DOT. The MPO focused heavily on capacity planning, local projects, conformity, land use and other issues. Now, MAP-21 requires that states, MPOs, and transit providers cooperate to set and achieve asset management targets. The target levels that states, MPOs, and transit agencies set will influence how much investment is needed to achieve them. Also, the project-selection decisions will often determine if the condition targets are met. It is likely that asset management and the MAP-21 performance targets will lead to even greater coordination over the complex tasks of setting asset targets, collecting inventory data, and planning for long-term investments.

PAVEMENT MANAGEMENT

MDOT and WVDOT each maintain a Pavement Management System (PMS) to collect and report pavement condition data on all paved interstates, U.S. highways, state highways, and county signed routes. These systems provide information necessary for planning, cost estimation, prioritization, budgeting, and programming for the appropriate maintenance activities. Both MDOT and WVDOT are reviewing and updating their management processes to address MAP-21 requirements.
Each state currently uses the International Roughness Index (IRI) to measure pavement quality. IRI is a measure of ride comfort and includes data on pavement rutting, faulting, and cracking. Data are collected with GPS controls, which allow direct measurement of the roadway and roadside features. Both states are working to establish and update performance measures and targets related to pavement condition.

Figure 4-11 illustrates pavement condition ratings in the 3-county HEPMPO region. The information is based on 2017 pavement management system data provided by each DOT in the region. The rating categories of "Good", "Fair" and "Poor" are based on a national system using the roadway IRI ratings. At this time, neither the WVDOT or MDOT has established specific targets for MPOs. MDOT's State Highway Administration (SHA) is currently working to develop 10-year pavement targets for the federal pavement performance measures as part of the asset management plan. The HEPMPO will continue to work with both state DOTs in developing these measures and will integrate the base year reporting and targets into future plan updates.

Pavement ratings and bridge conditions for the region are provided. HEPMPO will continue to monitor conditions and enhance reporting as new DOT reports and plans are produced.

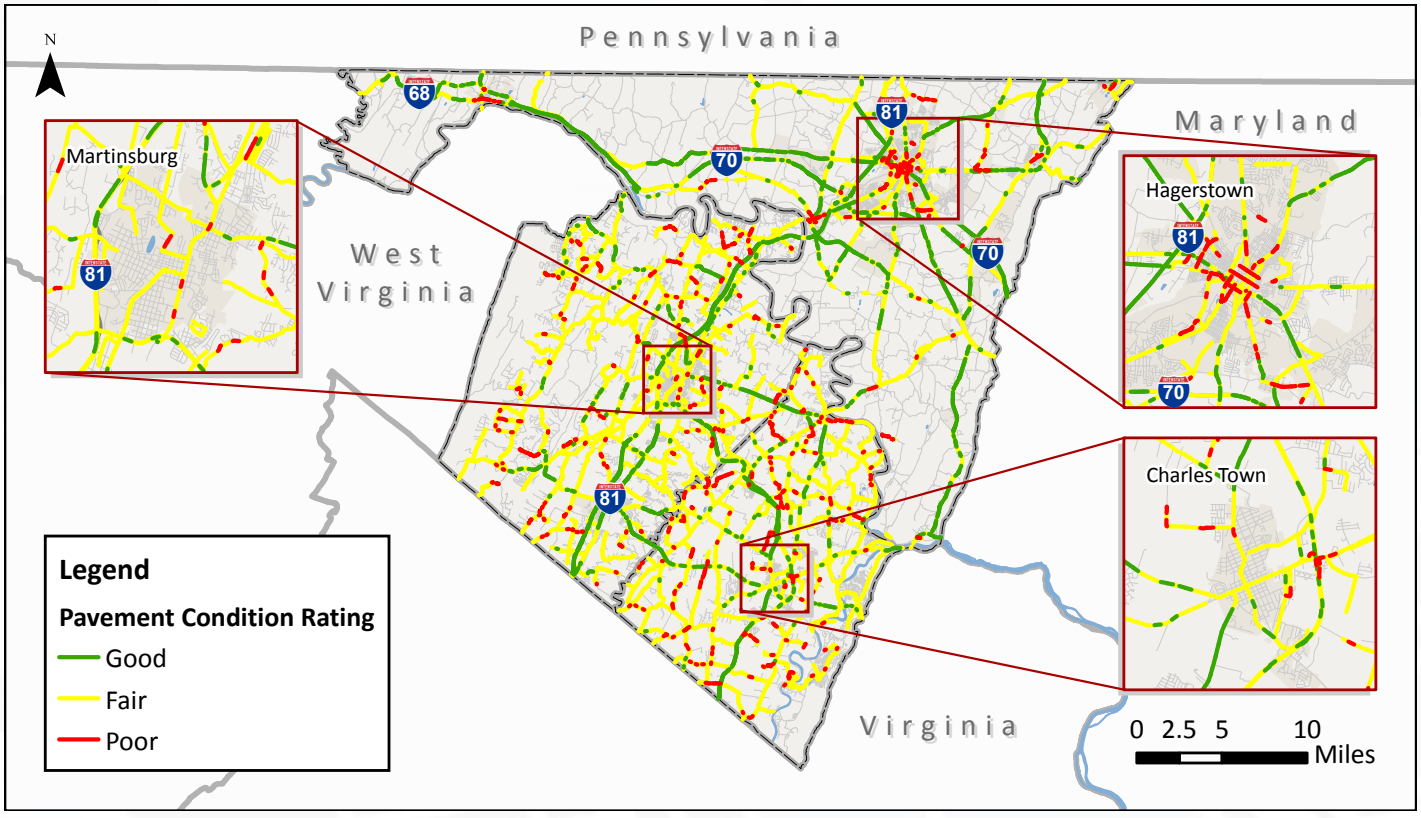


Figure 4-11: Pavement Condition Ratings in HEPMPO Region

BRIDGE MANAGEMENT

Agencies throughout the country are facing challenges related to the management of bridges and the escalating maintenance requirements of such large infrastructure assets. There are approximately 409 bridges throughout the tri-county HEPMPO region. **Table 4-3** highlights the number of structurally deficient bridges. The source for Maryland numbers was provided by MDOT. West Virginia bridge numbers were determined from the 2017 National Transportation Atlas Database. Both MDOT and WVDOT maintain a system to manage bridges throughout their design, construction, operation and maintenance. The major tasks in bridge management include collection of inventory data, inspection, assessment of condition and strength, repair, strengthening or replacement of components, and prioritization of funds.

MDOT has recently established 10-year targets for the federal bridge performance measures which includes the percent of NHS bridge deck area in good and poor conditions. These targets, when finalized, will be included in the asset management plan. The WVDOT has not established specific targets at this time.

Table 4-3: Bridges in the HEPMPO Region

County	Total Bridges	Structurally-Deficient Bridges
Washington	265	6
Berkley	106	15
Jefferson	38	6

Maryland and West Virginia are working to establish performance measures and targets related to pavement condition.

The structurally deficient rating is the key performance measure used to initiate the rehabilitation or replacement process and to assist in prioritizing and recommending system preservation funding. The rating applies to three main elements of a bridge: 1) deck (riding surface); 2) superstructure (main supporting element of the deck); and 3) substructure (supports to hold up the superstructure and deck). These elements are rated on a scale from zero (closed to traffic) to nine (relatively new). If any of the three elements are rated as a four or less, the bridge is categorized as structurally deficient by federal standards. This does not mean that the bridge is unsafe; if a bridge becomes unsafe, it is closed. The agencies place a high priority on bridge programs, as impassable bridges can cause significant rerouting of traffic and congestion delay. Moreover, in rural areas, closed bridges can create significantly longer travel distances for rural communities' daily activities and commutes.

Figure 4-12 illustrates bridges that have been identified as structurally deficient within the HEPMPO region. Similar to **Table 4-3**, this data was obtained from MDOT and the 2017 National Transportation Atlas Database representing past information submitted to FHWA. **Table 4-4** provides additional information on Washington County's local bridge conditions. These more detailed reports are currently not available for the counties in West Virginia. It is anticipated that more extensive information will be available for future HEPMPO LRTP updates after completion of each state's asset management plan.

Within each state, regional bridge condition data are collected and used with other data from local districts to review and prepare the bridge portion of the annual DOT work program. The candidate projects identified are included in the Transportation Improvement Program (TIP). Similar to pavement management, the bridge management systems in each state are undergoing enhancements to address MAP-21 requirements. The WVDOT is in the process of adding bridge element level inspection data to the condition data. After several years of collecting the data, the WVDOH plans to begin adding the use of sophisticated bridge management software components to the work process to help determine candidate bridges for funding. The WVDOT has continued to track performance measures on the number of deficient bridges and has established goals to decease the percentage of deck area on deficient bridges on the NHS in West Virginia. In Maryland, MDOT continues an aggressive bridge maintenance and rehabilitation program which keeps construction crews working full time, year-round. They have also addressed bridges that were deficient and minimized the number of bridges that may become deficient, created plans to replace deficient structures that cannot be corrected by remedial work, and efficiently utilized all bridge funding received in a timely manner.

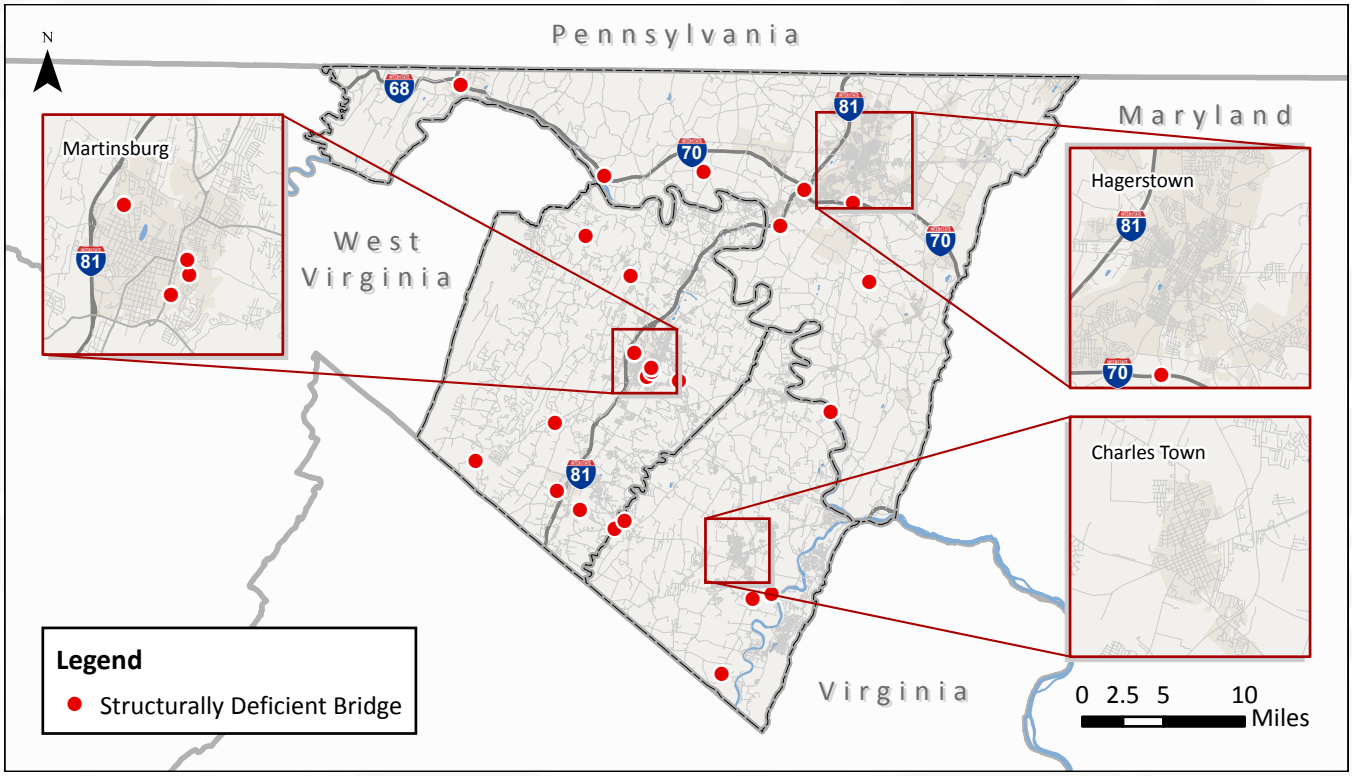


Figure 4-12: Structurally Deficient Bridges in the HEPMPO Region

Table 4-4: Washington County Local Bridge Report

2016 LOCAL GOVERNMENT BRIDGE PROGRAM

Washington County

	County Owned Bridges				SHA Owned Bridges
	2013	2014	2015	2016	2016
Total Number of Bridges	106	106	106	106	180
Total Number of SD Bridges	12	10	12	13	7
% SD Bridges	11%	9%	11%	12%	4%
Total Number of FO Bridges	35	35	36	36	26
% FO Bridges	33%	33%	34%	33%	14%

Washington County has 5 bridges in the design or construction stage using federal funds. There may be other bridges in design or construction using 100% local funds.

Statewide

2016 Local Government Owned Bridges		2016 SHA Owned Bridges	
Total Bridges	2361	Total Bridges	2567
Structurally Deficient	224	Structurally Deficient	67
% SD Bridges	9%	% SD Bridges	3%
Functionally Obsolete	516	Functionally Obsolete	352
% FO Bridges	22%	% FO Bridges	14%

Note: All data is based on April 2016 submittal to FHWA

CHAPTER FIVE
MULTIMODAL PLANNING

The regional transportation network is not only comprised of highways but also other types of infrastructure serving a variety of transportation modes and services. Within the HEPMPO region, there has been an increased emphasis in active transportation, with a focus on bicycle and pedestrian safety, mobility, and connectivity. Although freight includes use of our region's highways, it also includes important rail and aviation services that connect to freight companies that provide important economic benefits to our region and country. Understanding our freight systems' needs is an important component of multimodal planning and has received increased emphasis from our transportation funding bills. Transit services remain critical for connecting people to jobs and other destinations, especially for those who do not own cars. This chapter discusses multimodal aspects within the following sections.

ACTIVE TRANSPORTATION

"Active transportation" is a means of getting around that is powered by human energy, primarily walking and bicycling. Often called "non-motorized transportation," many prefer the term "active transportation" since it is a more positive statement that expresses the key connection between healthy, active living and our transportation choices. This section summarizes some of the recent bicycle & pedestrian initiatives in the HEPMPO region. HEPMPO's Regional Bicycle Plan (2016) provides additional detail on bicycle needs, recommended projects, and implementation steps. As such, the regional bicycle plan is an important component of **Direction 2045**.

REGIONAL BICYCLE PLAN SUMMARY

The HEPMPO, along with partner organizations, state and local governments, community members and consultants, developed the Regional Bicycle Plan to outline bicycle needs and priorities for the region, which includes a regional network map. The plan identifies mobility and safety needs, evaluates existing conditions, recommends specific improvements for key linkages, and highlights anticipated costs and potential implementation funding sources. The Regional Bicycle Plan included six key goals:

1. Promote bicycling as a healthy transportation alternative
2. Leverage the economic benefits generated by cycling
3. Plan and design with all users in mind
4. Expand the bicycle network and enhance connectivity
5. Enhance bicycle safety
6. Implement the plan and explore funding opportunities

The Western Maryland Rail Trail offers opportunities for cyclists of all abilities.

The Regional Bicycle Plan recommends a variety of infrastructure, signage, and policy-oriented improvements to help create a safer, healthier bicycle environment. These include designated bike lanes, signage to increase motorists' awareness of cyclists, paths for cyclists of all skill levels, and events, such as "open streets" days where a roadway is temporarily closed to car traffic, giving locals a fun opportunity to bike, walk, skate, and play.

BICYCLE FRIENDLY STATES AND COMMUNITIES

The League of American Bicyclists began its Bicycle Friendly State program in 2008 to better understand state efforts related to bicycling and provide a comparative framework that allows states to easily identify areas of improvement. In 2017, the League ranked Maryland as the 11th most bicycle friendly state in the country, down from 7th in 2014. While Maryland ranked in the top-20 in Infrastructure & Funding (11), Legislation & Enforcement (20), Policies & Programs (10), and Evaluation & Planning (12), it scored low in Education & Encouragement (40). Meanwhile, the League considers West Virginia the 37th most bicycle friendly state, an improvement from 2014 where the state ranked 44th. West Virginia ranked in the top-30 in Infrastructure & Funding (22) and Legislation & Enforcement (29), but scored low in Policies & Programs (42), Evaluation & Planning (42), and last in Education & Encouragement (50).

The League also evaluates communities and Hagerstown is one of only seven jurisdictions in Maryland and West Virginia with "Bicycle Friendly Community" status (Bronze). While the rankings are not perfect indicators of bike friendliness, they help identify areas for improvement, many of which are being addressed throughout the HEPMPO region.

RECENT ACTIVE TRANSPORTATION INITIATIVES IN THE HEPMPO

U.S. Bicycle Route 11 was recently signed in Maryland and the WVDOT is is also evaluating signage for the bicycle route. The Town of Williamsport was recently awarded $200,000 in state grant funding (Maryland Bikeways Program) to designate a bicycle lane on Conococheague Street. The project will be implemented as part of a resurfacing effort and will include striping and bicycle route signage. In addition, the Town recently received $983,000 through a Federal Lands Access Program (FLAP) grant, which will fund resurfacing and sidewalk improvements and ultimately improve accessibility and connectivity to/from the C&O Canal National Historical Park. A $800,000 FLAP grant was also awarded to Harpers Ferry and Ranson to help construct a shared-use path between the two communities.

The City of Hagerstown recently installed bike racks, signage, and pavement markings along the Hub City Bike Loop. The signage and pavement markings, reflecting the route's new insignia (photo below), will help cyclists follow the loop while alerting motorists of the presence of cyclists. In addition, the City recently received FY 2017 and FY 2018 funding from the Maryland Bikeways program, which will help the City implement several of it Bicycle Master Plan (2016) projects (**Table 5-1**).

Table 5-1: Maryland Bikeways Grants (FY 2017 and FY 2018) for the City of Hagerstown

FY 2017 Maryland Bikeways Grant	FY 2018 Maryland Bikeways Grant
P16 – Northern Avenue – Road Diet Study	P22 – Antietam Street – Sharrows
P17 – Oak Hill Avenue – Bike Lanes	P04 – Nottingham Road – Sharrows
P21 – Mulberry Street – Bike Lane	P15 – Pennsylvania Avenue – Sharrows
P28 – South Potomac Street – Proposed Sharrows	P24 – Lee Street – Sharrows
P29 – Fairgrounds Park – Bike Lane	P18 – Potomac Avenue – Bike Lanes
P30 – Security Road – Bike Lanes	Bike racks / stormdrain replacement at requested locations
P31 – Pangborn Boulevard – Sharrows	
P33 – Frederick Street – Bike Lanes	

In addition, the City was awarded FY 2018 funds to acquire and install bicycle racks or replace stormdrains at requested locations

As discussed in the Direction 2045 Safety section, the HEPMPO and the City of Hagerstown (Planning and Law Enforcement) recently evaluated crashes involving cyclists from January 2015 to September 2017. There were 33 crashes during the period, which were responsible for 1 fatality, 7 major injuries, and 25 minor injuries. The analysis provided several detailed findings:

- 14 crashes included cyclists who were 7-18 years old
- Cyclists were found to be at fault in 14 of the 33 crashes
- Cyclists were only wearing a helmet in 2 of the 33 crashes
- 4 crashes occurred in bike lane; 2 were caused by cars turning into bikes

The new Hub City Bike Loop signage and pavement markings

The crash analysis highlights that cyclists are involved in approximately one vehicle crash per month in the City and that cyclists are at fault in nearly half of the crashes. As discussed in the Regional Bicycle Plan, bicycle education and encouragement can go a long way in helping to teach cyclists about their responsibilities as a roadway user. In addition, outreach and engagement can offer potentially life-saving tips about bicycle safety and may include giveaways, such as free helmets and/or bike lights. A recent outreach success story in Ranson, West Virginia is highlighted below.

In September 2017, students gathered at Ranson Elementary School in Jefferson County for an educational bicycle course, known as a "Bike Rodeo." Helmets were given to attending students (courtesy of WVU Medicine Jefferson Medical Center) and the Ranson Police Department educated attendees on cycling safety and responsibilities, while also providing bicycle safety checks. Community events, like Bike Rodeos and "open street" days (where a street is closed to motorized traffic), help educate the community about safe cycling, while helping our youth build confidence in riding their bicycles.

The Bike Rodeo at Ranson Elementary provided free helmets to students and provided instruction on safe cycling. Source: WEPM

Infrastructure, like education, can help improve bicycle and pedestrian safety and mobility. For example, the City of Ranson's recent streetscaping enhancements to Fairfax Boulevard help calm traffic, reduce vehicular speeds, shorten pedestrian crossings, and reduce stormwater runoff through green infrastructure (landscaping, street trees). Similarly, the proposed streetscape and traffic calming improvements on Fifth Avenue in Ranson aim to reduce vehicular speeds, extend and connect sidewalks, and shorten pedestrian crossings. Further east on Fifth Avenue, the HEPMPO, the City, and WVDOH are exploring a "road diet" alternative, which typically involves removing travel lanes from a roadway and repurposing that space for other uses and travel modes. The "road diet", if determined to be feasible, could improve active transportation mobility and safety along the corridor.

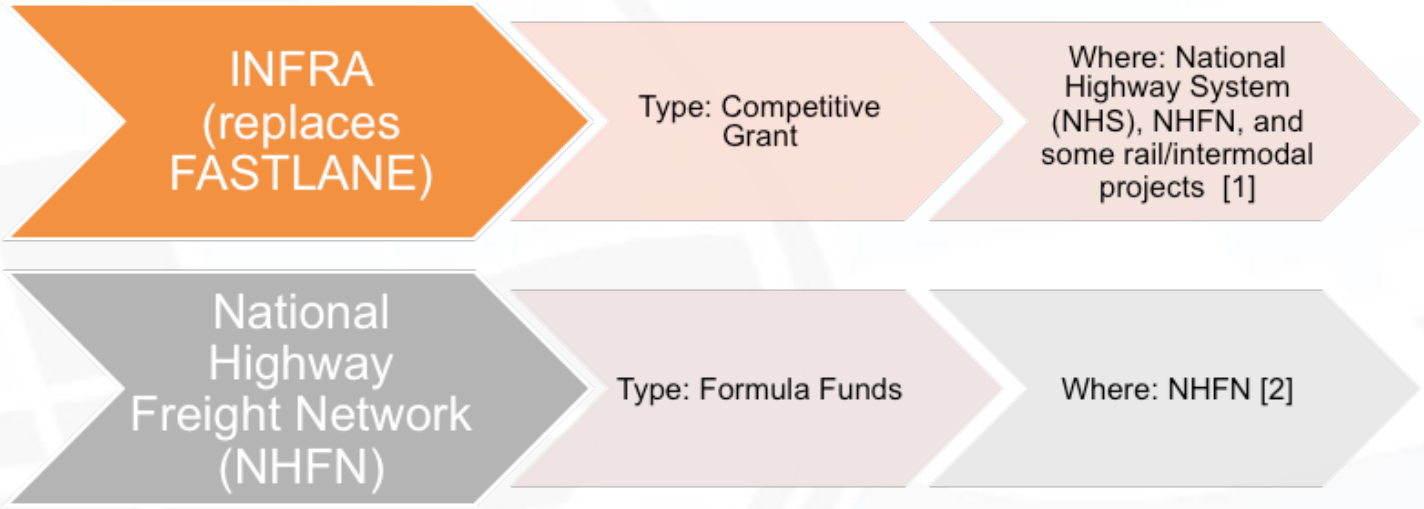
Proposed "Road Diet" cross section of Fifth Avenue in Ranson (above). Source: HEPMPO Regional Bicycle Plan

REGIONAL FREIGHT PROFILE

Freight is a contributor to the local economy of the HEPMPO region with truck traffic comprising a significant percentage of vehicles on area roadways. A reliable transportation network is necessary for the free flow movement of goods and services within and through the region. Within the HEPMPO region, the main highway corridors for freight movement are: I-81, I-70, US 340, US 40, US 11 and WV 9. There are nearly 19,000 daily trucks on I-81 in Martinsburg (Station 028437), representing approximately 1 in 4 vehicles (WVDOT).

THE FAST ACT

The FAST Act, signed into law on December 4, 2015, establishes a national freight policy and combines targeted reforms with competitive investment and formula funding. The policy requires the federal government and states to continually update their strategic freight plans and introduces several important freight strategies and programs, which are summarized in **Figure 5-1** and discussed in detail below.



[1] Rail/intermodal projects include railway-highway grade crossing or grade separation projects and freight projects that are intermodal or rail, in nature, or within the boundaries of a public or private freight rail, water, or intermodal facility

[2] NHFN funds can only be used for projects on the Primary Highway Freight System (PHFS), other interstates not on the PHFS, and the Critical Rural Freight Corridors and Critical Urban Freight Corridors

Figure 5-1: FAST Act Funding Programs

The FAST Act created the FASTLANE* grant program, a $4.5 billion competitive grant program, which prioritizes "nationally significant freight and highway projects." The FASTLANE program was rebranded in June 2017 as the Infrastructure for Rebuilding America (INFRA) program, which uses updated criteria to evaluate projects. Pursuant to the FAST Act, INFRA allocates at least 25% of funding for rural projects. The program is available to MPOs, port authorities, and other multi-state entities and covers non-highway projects, such as intermodal and port-related initiatives.

**Fostering Advancement in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE)*

In addition, the FAST Act launched a $6.3 billion freight formula program on a newly-designated National Highway Freight Network (NHFN), whose purpose is to strategically direct Federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system. The NHFN includes the following four subsystems of roadways:

- Primary Highway Freight System (PHFS): This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable national data (23 U.S.C.167(d)(2)(C)). The PHFS in the HEPMPO includes I-81 and I-70.
- Other Interstate portions not on the PHFS: These highways consist of the remaining portion of Interstate roads not included in the PHFS. These routes provide important continuity and access to freight transportation facilities. I-68, located in western Washington County, falls under this category.
- Critical Rural Freight Corridors (CRFCs): These are public roads not in an urbanized area, designated by the States, which provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or other intermodal freight facilities. The HEPMPO, with approval from the Interstate Council, recommends designating the following as CRFCs:
    - WV 9, from Berkeley County line to Wiltshire Road
    - US 340, from Virginia state line to Roper North Fork Road
    - US 340, from Shepherdstown Pike (Route 230) to Frederick County MD line
- Critical Urban Freight Corridors (CUFCs): These are public roads in urbanized areas which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities. The region's designated CUFCs, which were approved by the Interstate Council, include:
    - GM Access Road/Caperton Boulevard, north of the I-81/WV 9 interchange
    - Tabler Station Road, south of the Eastern West Virginia Regional Airport
    - US 340, from Charles Town Road to Patrick Henry Way
    - WV 45, I-81 to WV 9
    - Halfway Boulevard, from Hopewell Road to I-70
    - MD 63, from I-70 to Elliott Parkway
    - Oak Ridge Drive and MD 65, from Villa Ridge Drive to Colonel Henry K. Douglas Drive

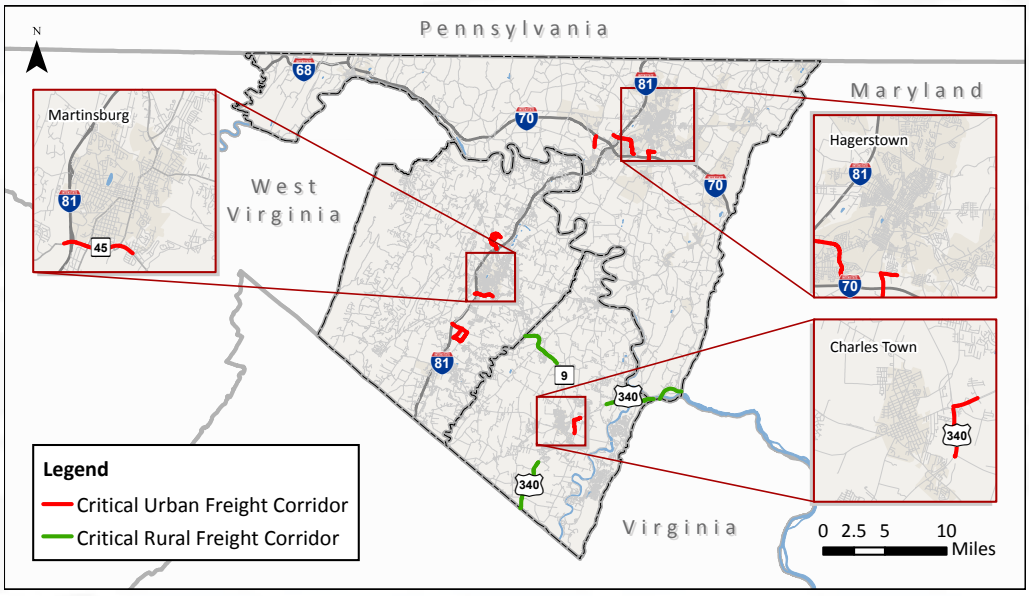


Figure 5-2: Designated Critical Urban Freight Corridors and Recommended Critical Rural Freight Corridors in the HEPMPO

ECONOMIC ACTIVITY

Freight networks are integral in connecting metropolitan areas to regional, national, and global markets. The Brookings Institute's regional freight flow data indicate that the Hagerstown, MD-WV region accounts for approximately $25.3 billion in annual trade flows (imports and exports) as shown in **Figure 5-3**. The region imports $13.5 billion per year in commodities and exports approximately $11.8 billion per year in commodities. The region's largest commodity exports (by value) include machinery/tools ($676 million), mixed freight ($540 million), and chemicals/plastics ($451 million), while its largest trade imports include electronics ($2.7 billion), transportation equipment ($568 million), and energy products ($538 million). The region's most prominent trade partners include the New York, NY-NJ-PA region, the Washington, DC-VA-MD-WV region, and the other areas of Pennsylvania (Figure 5-3). Goods production and shipping are no longer dominated by single production lines, as evident by the region's range of trading partners.

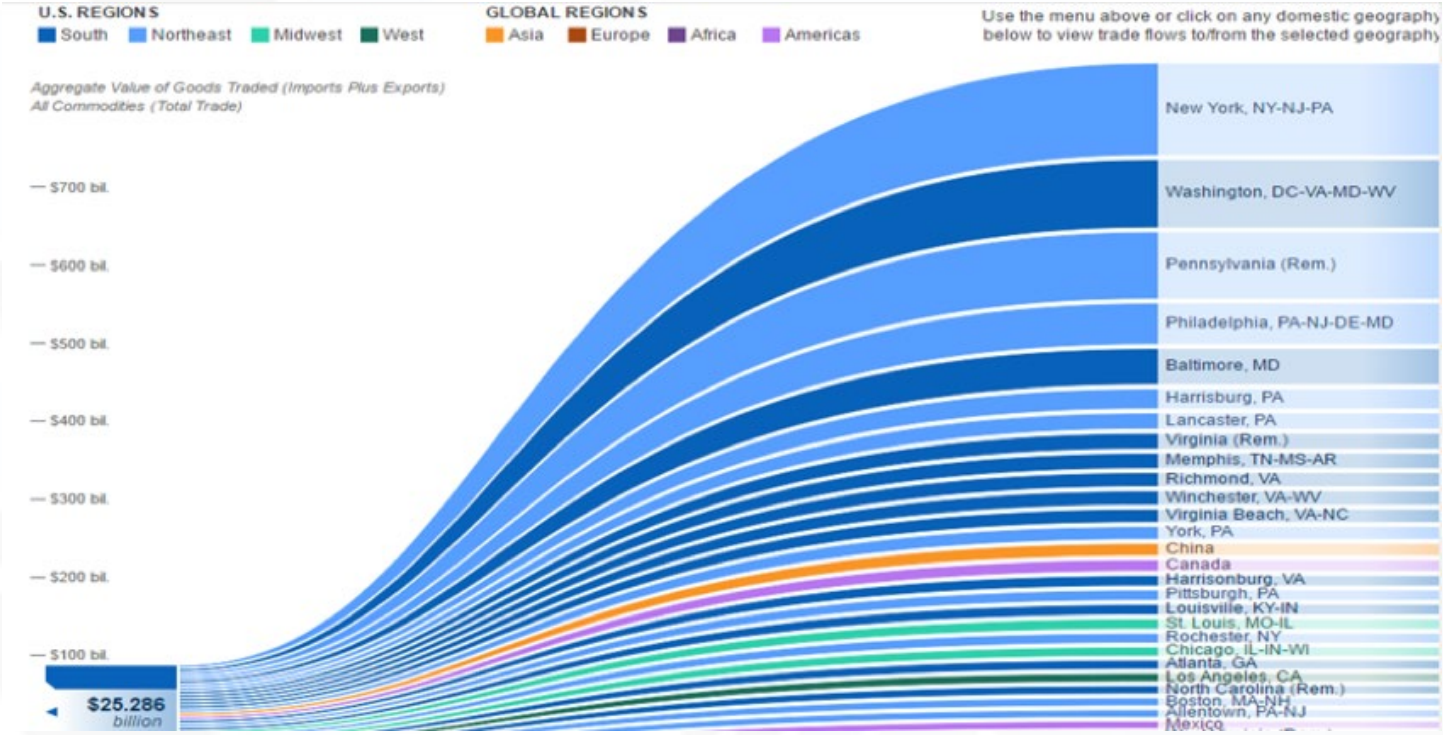


Figure 5-3: Trade of All Commodities (Total Trade) between Hagerstown, MD-WV and its Largest Trading Partners

HIGHWAY FREIGHT

The United States has seen a dramatic increase in truck activity since the deregulation of the trucking industry in the 1980s. Meanwhile, e-commerce is revolutionizing the retail, supply chain, and logistics industries. Online sales accounted for 7.2% of all retail sales in 2015, up from just 0.2% in 1998. According to the USDOT, the continued surge in online shopping could reduce household travel associated with shopping trips, but it may also increase truck traffic in urban areas as goods are directly delivered to residences. Emerging transportation technologies, like connected and automated vehicles (CAVs) could further transform the trucking industry, potentially leading to increased safety and efficiency as trucks are able to communicate with each other and the surrounding environment.

The I-81 corridor accounts for much of the commercial freight trips in the region, the highest concentrations of which are found in the Martinsburg Mall area, which includes Walmart, and the Valley Mall area of Hagerstown, which includes Target and other prominent retailers (**Figure 5-4**).

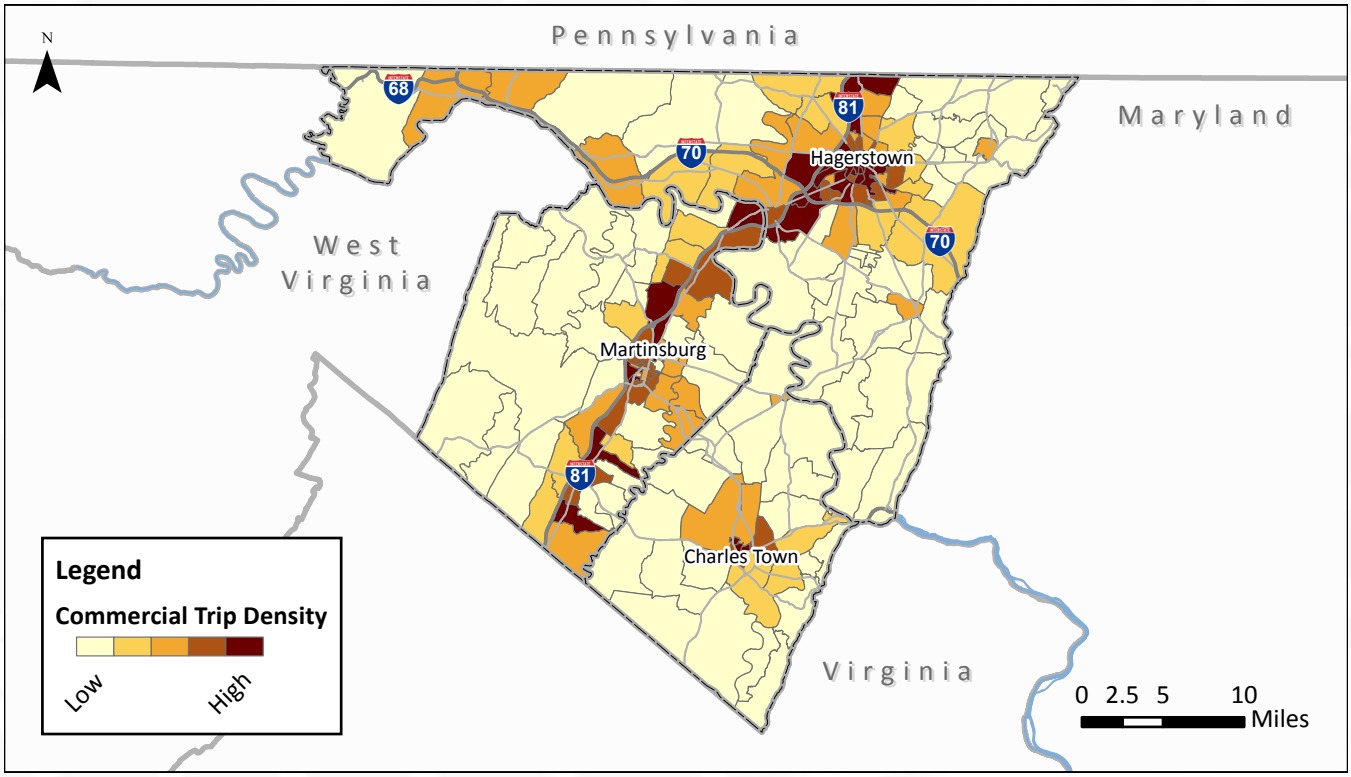
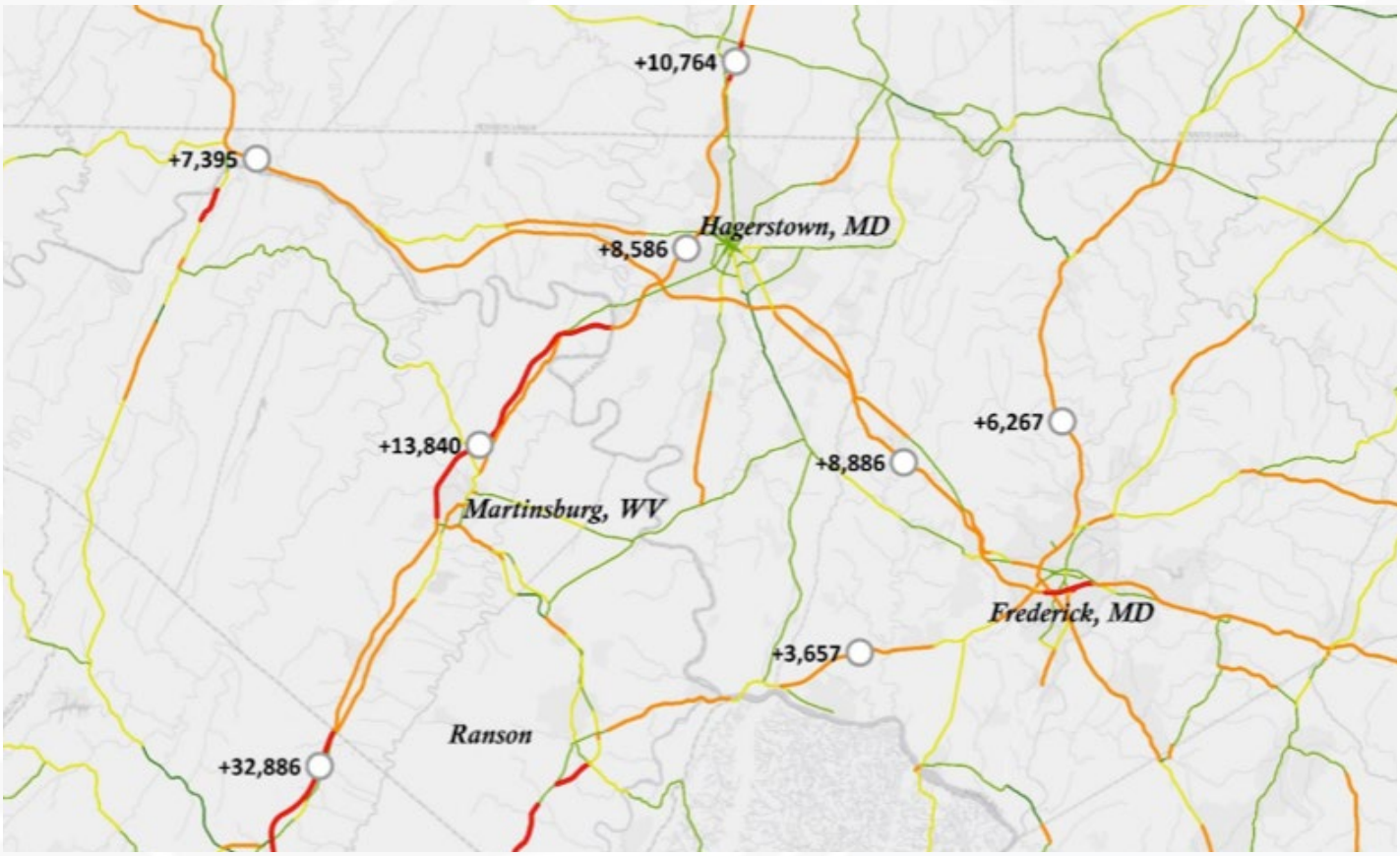


Figure 5-4: Commercial Trip Activity in the HEPMPO Region

The FHWA's Freight Analysis Framework (FAF) forecasts significant growth in regional daily truck traffic between 2018 and 2045 (**Figure 5-5**). The FAF estimates that I-81, northwest of Martinsburg, will see an additional 13,800 daily trucks and that I-81, southwest of Hagerstown, will see an additional 8,600 daily trucks. Meanwhile, the FAF anticipates 7,400 additional daily trucks on I-70 in western Washington County.



Data Source: Freight Analysis Framework (FAF)

Figure 5-5: Projected Daily Truck Growth (2018 to 2045)

Truck parking options and availability are critical, particularly in regions, like the HEPMPO, with nationally significant freight corridors. There are approximately 10 parking lots in the HEPMPO region that offer truck parking. While there are estimates for the total number of spaces at most of these lots, WVDOT and MDOT are currently conducting truck parking surveys. The National Collation on Truck Parking, established by the USDOT, published an Activity Report in 2016 that provides recommendations for parking capacity; technology & data; funding, finance & regulations; and state, regional, and local coordination. While not all of the recommendations apply to MPOs and municipalities, several relevant suggestions include:

- Develop tools to disseminate real-time information about parking availability at rest areas and truck stops
- Build parking availability and reservation capabilities into vehicle-to-everything (V2I) technologies
- Promote innovative local land-use controls and funding mechanisms such as industrial park co-operatives or industrial tax districts for pooled parking in industrial areas
- Address truck parking in state and regional freight plans
- Conduct outreach on truck parking

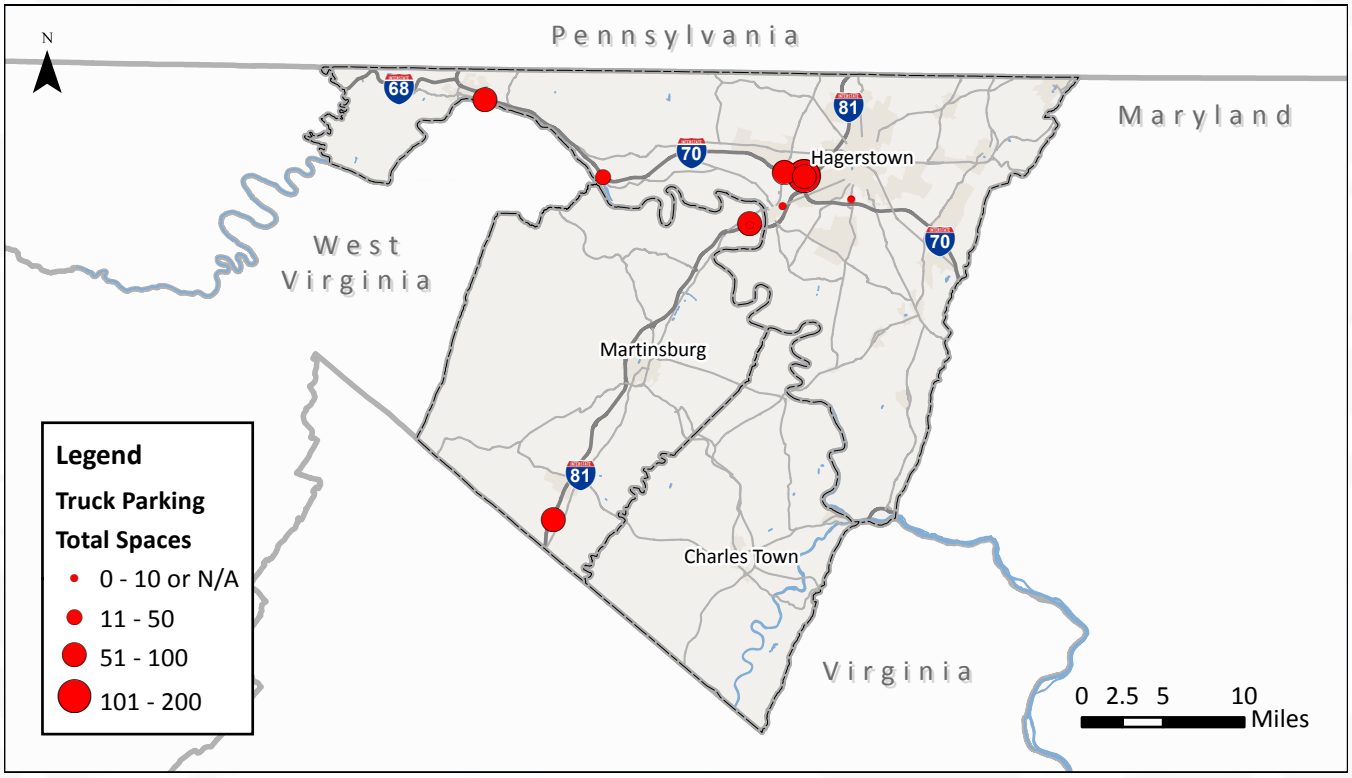


Figure 5-6: Parking Lots that Offer Truck Parking

RAIL FREIGHT

In addition to freight movement along the highways, the HEPMPO region also has an extensive rail network that facilitates the movement of freight. Norfolk Southern and CSX own and operate a combined 283 miles of major rail corridors that provide the HEPMPO region with access to the Northeast, Midwest, and Southeast markets of the United States.

The CSX I-70/I-76 corridor links the Baltimore and Washington, D.C. area to Northwest Ohio via Pittsburgh and is part of the CSX National Gateway Plan. The National Gateway Plan is a CSX effort to provide enhanced service between Mid-Atlantic ports and markets in the Midwest by providing double-stacking service to increase container capacity. The corridor enters the HEPMPO region parallel to MD 64 near Smithsburg in Washington County, MD, continues through the City of Hagerstown, and then travels west parallel to I-70 past Hancock.

The Winchester & Western Railroad is a short line railroad, operating from Gore, Virginia to Hagerstown, Maryland. The rail line provides connections to CSX and Norfolk Southern and will serve the new Procter & Gamble Facility at Tabler Station Business Park in Berkeley County.

Norfolk Southern also has a prominent presence in the HEPMPO region. The Crescent Corridor, operated by Norfolk Southern, is a key north/south corridor that provides intermodal freight service between the Southeast United States and New England. The Crescent Corridor parallels the I-81 corridor, entering the HEPMPO region from Front Royal, VA in the south. The Crescent Corridor continues through the HEPMPO region passing through Charles Town and Shepherdstown in Jefferson County, as well as the City of Hagerstown, before continuing northeast toward the Harrisburg, Pennsylvania area.

Just across the Maryland-Pennsylvania border in Franklin County, Pennsylvania, the Franklin County Regional Intermodal Facility (FCRIMF) was constructed on a 200-acre site off of I-81 in the Township of Antrim and has been opened for operation since its completion in December 2012. The facility was part of a Norfolk Southern Crescent Corridor series of projects -- a 2,500-mile network of rail and terminals that help moderate truck traffic on congested roadways and reduce carbon emissions. The terminal, with its 670 paved trailer/container parking spots is a major gateway for freight in the Mid-Atlantic. The HEPMPO is continuing to coordinate with other state agencies to identify the potential impacts of this facility on I-81 truck traffic both now and in the future.

Norfolk Southern is one of the region's prominent freight rail operators

AVIATION

The HEPMPO region is served by the Hagerstown Regional Airport in Washington County and the Eastern West Virginia Regional Airport in southern Berkeley County. Both airports are classified as general aviation airports and provide general aviation services, such as charter flights and aviation aircraft maintenance, for both public and private entities.

The Hagerstown Regional Airport typically schedules daily flights on Allegiant and/or Southern Airways. In addition to commercial air service, the Hagerstown Regional Airport includes aircraft inspection services and maintenance facility. The Hagerstown Regional Airport is served by two runways, a primary runway that is 7,000 feet long and a secondary runway that is 3,160 feet long. The Hagerstown Regional Airport is regarded as an economic engine for the region. It enables direct employment in airport operations and general aviation services, and it also supports local business growth by providing mobility through both commercial and private aviation services.

While the Eastern West Virginia Regional Airport is not currently served by commercial passenger air service, the airport serves as the base for a variety of general commercial services, including a flight school, maintenance facility, and charter flight services. The Eastern West Virginia Regional Airport also serves as the home for the 167th Airlift Wing of the West Virginia Air National Guard unit, which uses the hangar facilities to store aircraft and provides global strategic air cargo capability with their fleet of eight C-17 Globemaster III aircraft. The Eastern West Virginia Airport has one runway that is 8,815 feet long, with a full parallel taxiway available. This airport is considered to have long-term strategic value as part of a reliever airport system for the greater Washington, D.C. region.

Eastern West Virginia Regional Airport serves as the home for the 167th Airlift Wing of the West Virginia Air National Guard.

FREIGHT FOCUS GROUP

Direction 2045 included a Freight focus group survey to help understand regional freight needs. The survey was distributed to trucking companies, rail operators, airports, and state agencies. The survey respondents (5) identified several freight strengths and weaknesses in the region (**Figure 5-7**) and also provided input on bottlenecks and safety concerns (**Figure 5-8**).

Strengths	Weaknesses
• Regional connectivity	• Congestion on I-81
• Proximity to interstates and metropolitan areas	• Lack of major civilian airport cargo terminal
• Rail lines	• Project coordination between states
• NS, CSX, Winchester & Western Rail lines	• Poor highway infrastructure
• Long range planning efforts	• Lack of truck-to-rail and rail-to-truck container lift/ intermodal facility

Figure 5-7: Freight Survey Input on Perceived Strengths and Weaknesses in the HEPMPO

Bottlenecks	Safety Concerns
• I-81 AT I-70	• I-70 and MD 65 interchange
• I-81 at US 11 (Exit 2)	• I-70 and I-81 interchange
• I-81 from Martinsburg to Hagerstown	• I-81 (throughout the region)

Figure 5-8: Freight Survey Input on Bottlenecks and Safety Concerns

The survey also asked participants about their expectations for autonomous (driverless) trucks. Three respondents said that they anticipate autonomous trucking will improve freight efficiency within 6-10 years; one respondent said 16-20 years; and another respondent did not think that autonomous vehicles will impact freight efficiency.

Respondents concluded with regional freight recommendations, providing suggestions for roadway widening, air cargo, truck climbing lanes, improved lighting, intermodal connections, and technology. The specific recommendations include:

- I-81 widening in Maryland
- Construction of civilian air cargo terminal facility
- Widening and longer designated truck climbing lanes
- Improved lighting
- Development of truck-to-rail and rail-to-truck intermodal facility
- Autonomous trucking

Otto has already begun testing autonomous trucks on interstates.
Source: Otto

PUBLIC TRANSIT

This section reviews the existing transit systems, facilities, and services; transit performance measures; analyzes the transit service gaps; and estimates the overall transit demand within the study area. This information was used in the development of transit strategies and services to meet the demand and service gaps for the transit-dependent and general public populations throughout the region. The last section of the transit element lists the projects, details the services by transit agency, and estimates the overall operational and capital costs for the next 28 years. See **Appendix E** for a detailed transit analysis.

TRANSIT PROVIDERS OVERVIEW

Currently, four transit agencies provide service in the HEPMPO region, including Amtrak, the Maryland Transit Administration (MTA), the Eastern Panhandle Transit Authority (EPTA), and Washington County Transit (WCT). The services provided by these agencies include various fixed route, commuter, express and demand responsive bus services as well as commuter rail services. The existing services in the HEPMPO region are outlined below by agency and depicted in **Figure 5-9**.

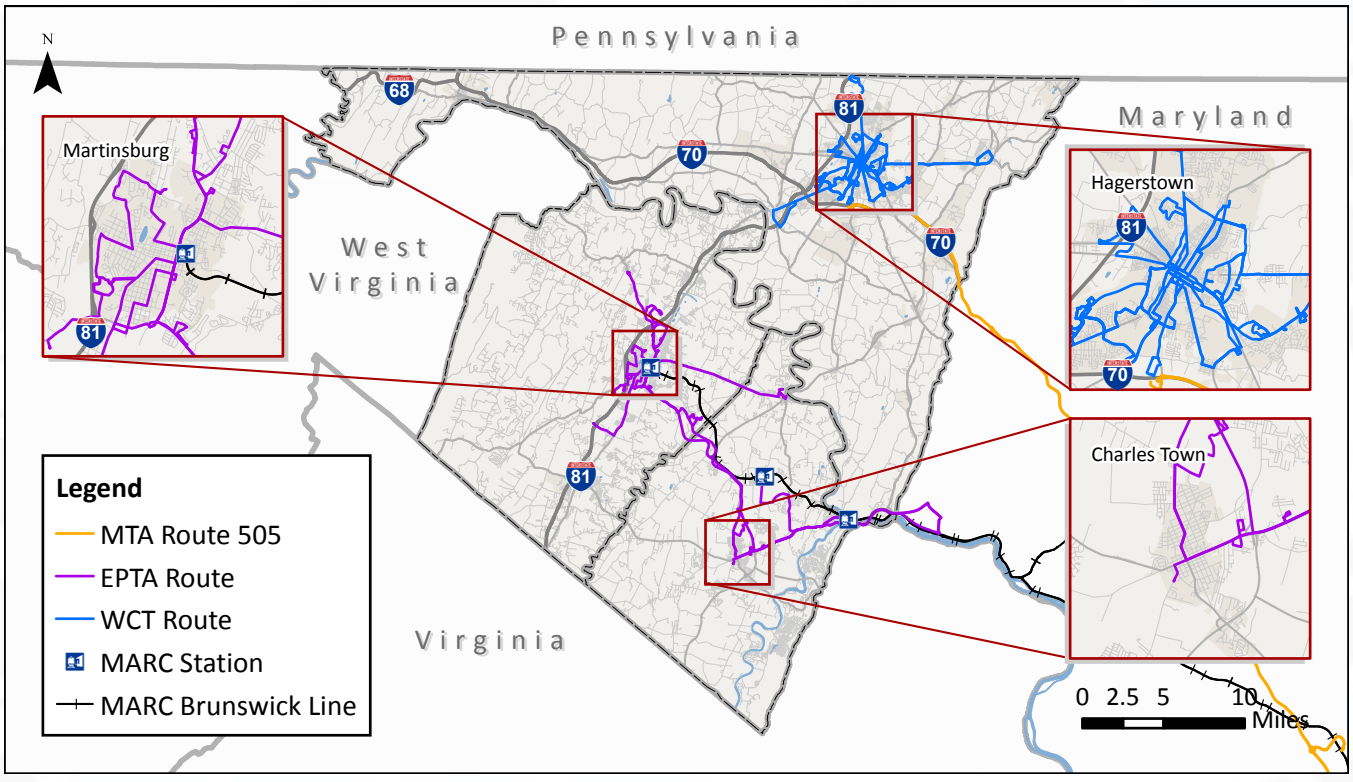


Figure 5-9: Transit Services in the HEPMPO Region

WASHINGTON COUNTY TRANSIT (WCT)

WCT is the public transportation service for Washington County, focusing the majority of its service in Hagerstown, Smithsburg and Williamsport. Four types of transit service are provided: fixed route service on nine routes, demand-response service on the Job Opportunity Bus Shuttle (JOBS), demand-response ADA paratransit service, and a contracted ride-assist voucher program funded by the Statewide Special Transportation Assistance Program (SSTAP). JOBS is operated in partnership with the Washington County Department of Social Services. JOBS provides eligible riders with transportation to and from work and childcare facilities. ADA paratransit service provides curb-to-curb transportation for eligible persons with disabilities who cannot access regular fixed-route transit services. The paratransit service area includes any trip origin or destination within ¾ mile of the fixed-route transit system. The SSTAP ride-assist voucher program is designed to help the elderly and those with disabilities to meet their transportation needs and is not limited to any specific trip purpose. In total, the Washington County Transit system has 19 revenue vehicles and conducts 456,523 annual passenger trips.

Washington County Commuter

EASTERN PANHANDLE TRANSIT AUTHORITY (EPTA)

The Eastern Panhandle Transit Authority (EPTA) operates fixed-route deviated and demand-response service Berkeley County and Jefferson County, WV. The fixed-route deviated service primarily serves the communities of Martinsburg, Shepherdstown, Charles Town, Ranson, and Harpers Ferry.

EPTA offers deviated service on all fixed routes that provides pickups and drop-offs up to ¾ mile from fixed-route service, with reservations required 24 hours in advance. Demand-response service is available to people who live between ¾ and 1 ½ miles from fixed-route service and people living in parts of Hedgesville and Inwood. EPTA is also a provider for non-emergency medical transportation trips throughout Berkeley and Jefferson Counties, which provides free trips to medical appointments for Medicare recipients. EPTA is reimbursed for the Medicare trips through the Non-Emergency Medical Transportation Program. Overall, EPTA has 26 revenue vehicles and conducts 193,113 annual passenger trips.

An EPTA Bus

MTA COMMUTER BUS

The Maryland Transit Administration (MTA) operates commuter bus service between Hagerstown, Shady Grove, and the Rock Spring Business Park on Route 505. Eight inbound trips (to Shady Grove/Rock Spring) are provided in the AM Peak and 10 outbound trips are provided in the PM Peak. Connections are available to the Metrorail system at Shady Grove station. The route also serves the Myersville Park and Ride in Frederick County. Route 505 conducts 97,986 annual passenger trips overall.

MTA Commuter Service

MARC BRUNSWICK LINE

The Maryland Transit Administration (MTA) operates the Maryland Area Regional Commuter (MARC) train service, consisting of three commuter rail lines that serve the Baltimore and Washington areas. The MARC system is fixed-route and is open to the general public. The MARC Brunswick Line runs between Martinsburg, WV and Union Station in downtown Washington, DC, with stops at Martinsburg, Duffields and Harpers Ferry in the HEPMPO region. Major stops within Maryland include Gaithersburg, Rockville and Silver Spring. Frederick, MD is also served by a spur on this line. Overall, the West Virginia MARC stations see 75,125 annual passenger trips.

The MARC Brunswick Line

AMTRAK

The Amtrak Capitol Limited Line also stops in Martinsburg and Harpers Ferry, with one roundtrip provided daily on weekdays. This line connects Washington, DC with Rockville, MD; Pittsburgh, PA; Cleveland, OH; Toledo, OH; and Chicago, IL.

TRANSIT PERFORMANCE MEASURES

Transit Asset Management (TAM) performance measures were established by FTA under the aegis of MAP-21, and this mandate was reauthorized by the 2015 FAST Act. EPTA and WCT have three performance measures based on their classification: rolling stock, facilities, and equipment.

EPTA came close to or met all 2017 benchmarks. In no category did they fall more than 2% below their 2017 goal, and in four categories—12 year rolling stock, both facility categories, and maintenance equipment—they achieved a perfect rating. WCT has met its performance targets in every single category, including all types of rolling stock, equipment, and facilities.

SAFETY PERFORMANCE MEASURES

The FTA has established a final rule necessitating the creation of a Public Transportation Agency Safety Plan (PTASP). The PTASP needs to include a Safety Management System (SMS), information on safety risk identification, minimizing exposure to hazards, an annual review and update to the plan, performance targets, the establishment of a Safety Officer, and a comprehensive training program. FTA has introduced four categories of safety performance measures:

- Fatalities: total number of reportable fatalities and rate per unlinked passenger trip
- Injuries: total number of injuries and rate per unlinked passenger trip
- Safety Events: total number of events and rate per vehicle mile
- System Reliability: mean distance between failures

Measures for each EPTA and WCT in FY2016 for safety events, injuries, and fatalities are summarized in **Table 5-2**. Measures for system reliability were not tracked for either agency.

Each agency will be required to set safety performance targets and submit them to the state and MPO so that they can be used as input to the state and MPO plans. WCT will draft its own Safety Plan, however EPTA's will be drafted by the state with EPTA's input.

Table 5-2: Safety Performance Measures for EPTA and WCT in FY2016

Measure	Rate Per:	EPTA		WCT	
		TOTAL	RATE	TOTAL	RATE
Safety Events	Vehicle Mile	4	0.000007	1	0.000002
Injuries	Passenger Trip	4	0.000021	1	0.000002
Fatalities	Passenger Trip	0	0.000000	0	0.000000
System Reliability (Mean Distance Between Failures)	-	-	-	-	-

TRANSIT NEED & GAP ANALYSIS

In order to help determine transit need in the HEPMPO region, a transit need and gap analysis was performed. The transit need analysis uses a number of different demographic factors to determine geographic areas of high transit origin and destination need for peak periods and for all day service. Based on this analysis, a travel flow analysis, future population and employment growth projected for the HEPMPO region, public input, and existing route performance, a number of gaps in transit service were identified. These gaps include geographic coverage gaps, connection gaps, and level of service gaps.

Coverage and connection gaps are illustrated in **Figure 5-10** and **Figure 5-11** for peak periods and all-day service, respectively. The majority of these gaps are between the major municipalities of the region, including Hagerstown, Martinsburg, Shepherdstown, Charles Town, and Ranson.

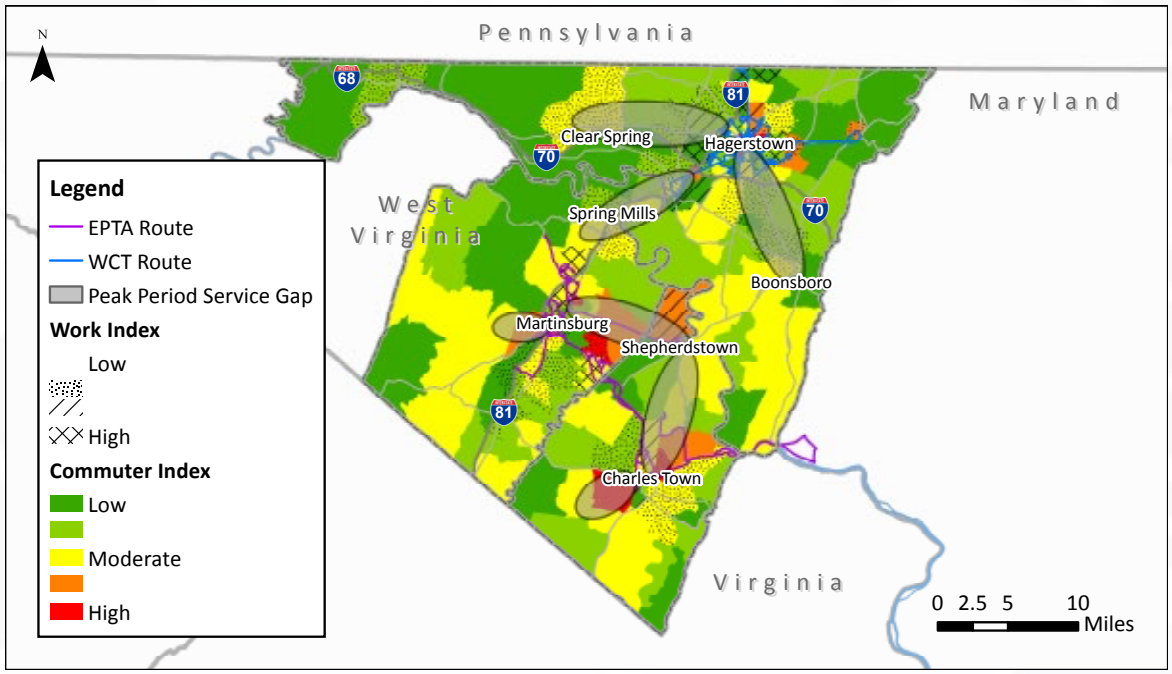


Figure 5-10: Peak Period Coverage and Connection Gaps

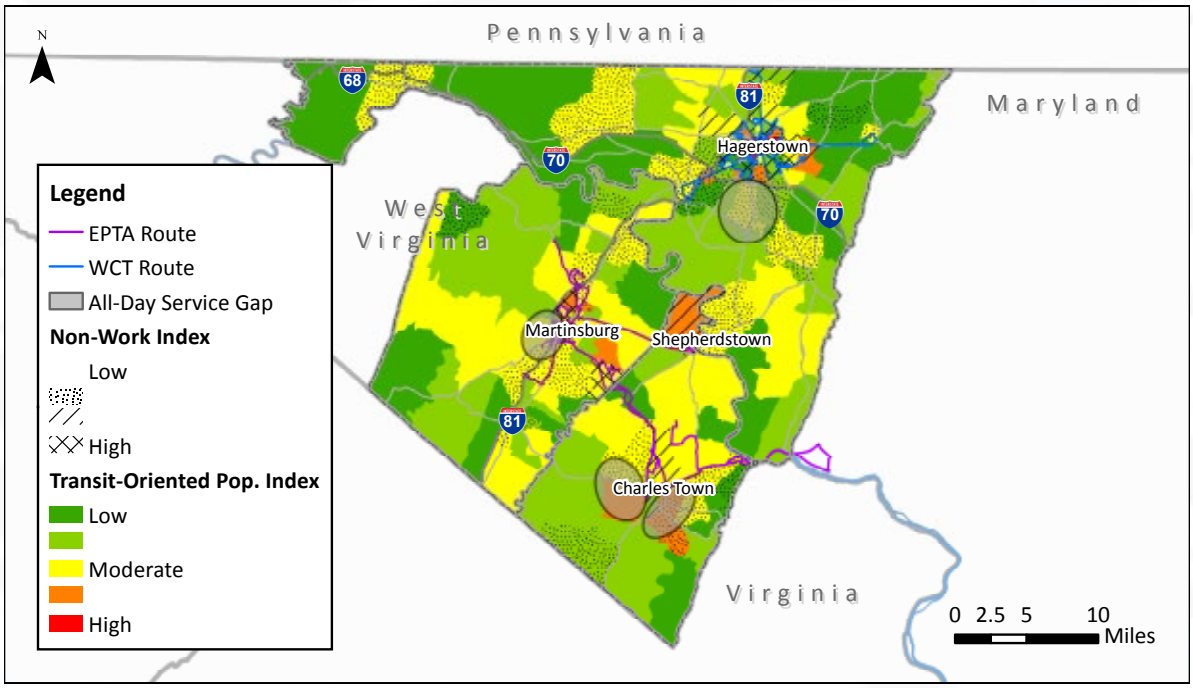


Figure 5-11: All-Day Coverage and Connection Gaps

PUBLIC TRANSIT INITIATIVES

WCT

WCT has several planned initiatives related to public transit, including new paratransit software, improvements to its garage, a bus stop initiative, and a "mini-hubs" initiative. The bus stop initiative involves formalizing bus stop locations at major locations across the WCT service area. The "mini-hubs" initiative involves formalizing transfer points outside of the main transit center in downtown Hagerstown and providing additional passenger amenities at these locations.

EPTA

EPTA has several initiatives underway that have funding in place over the next five years, including a bus shelter initiative, new driver pads, new bus radios, new fare and data collection systems, and a relocation of its transit center.

RECOMMENDATIONS

This section recommends a number of improvements to the transit network in the HEPMPO region in order to fill gaps that have been identified and also improve the transit experience for existing and future riders. There are several types of recommendations, including:

- New or improved services to fill gaps in the transit network,
- Capital improvements, including new passenger amenities and new infrastructure,
- Coordination strategies, and
- Staffing.

NEW OR IMPROVED SERVICES

To fill the gaps identified in the regional transit system, a number of new or extended services are recommended for both the EPTA and the WCT systems. Additionally, improvements to existing routes are recommended to better match demand. The recommendations and their implementation periods are summarized in **Table 5-3** and illustrated in **Figure 5-12 (next page)**.

Table 5-3 New or Improved Services to Fill Gaps in the Transit Network

Gap Type	Location	Necessary Improvement	Priority/ Implementation
Coverage	Delmar Orchards area of Martinsburg	All-day service on weekdays	Prior to 2030
	Southwest Charles Town along Augustine Ave	All-day service on weekdays	2030 to 2040
	Southeast Charles Town along Charles Town Rd	All-day service on weekdays	2030 to 2040
	Sharpsburg Pike Walmart	Extend Premium Outlets route	Prior to 2030
Connection	Martinsburg to Spring Mills Walmart	All-day service on weekdays	Prior to 2030
	Martinsburg to Hagerstown	Peak period service on weekdays	Prior to 2030
	Clear Spring to Hagerstown	Peak period service on weekdays	2030 to 2040
	Boonsboro to Hagerstown	Peak period service on weekdays	2030 to 2040
	Charles Town to Shepherdstown	Peak period service on weekdays	2040 to 2045
Level of Service	WCT West End Route	Improve weekday headway	Prior to 2030
	WCT Robinwood Route	Increase weekday span of service	Prior to 2030
	WCT Funkstown Route	Improve weekday headway	2030 to 2040
	WCT Robinwood Route	Improve weekday headway	2030 to 2040
	WCT Premium Outlets	Add Sunday service	2030 to 2040
	WCT Valley Mall	Add Sunday service	2030 to 2040
	EPTA Yellow Route	Improve weekday headway	Prior to 2030
	EPTA Yellow Route	Add Sunday service	2030 to 2040
	EPTA Shepherdstown Route	Peak period service on weekdays	2040 to 2045

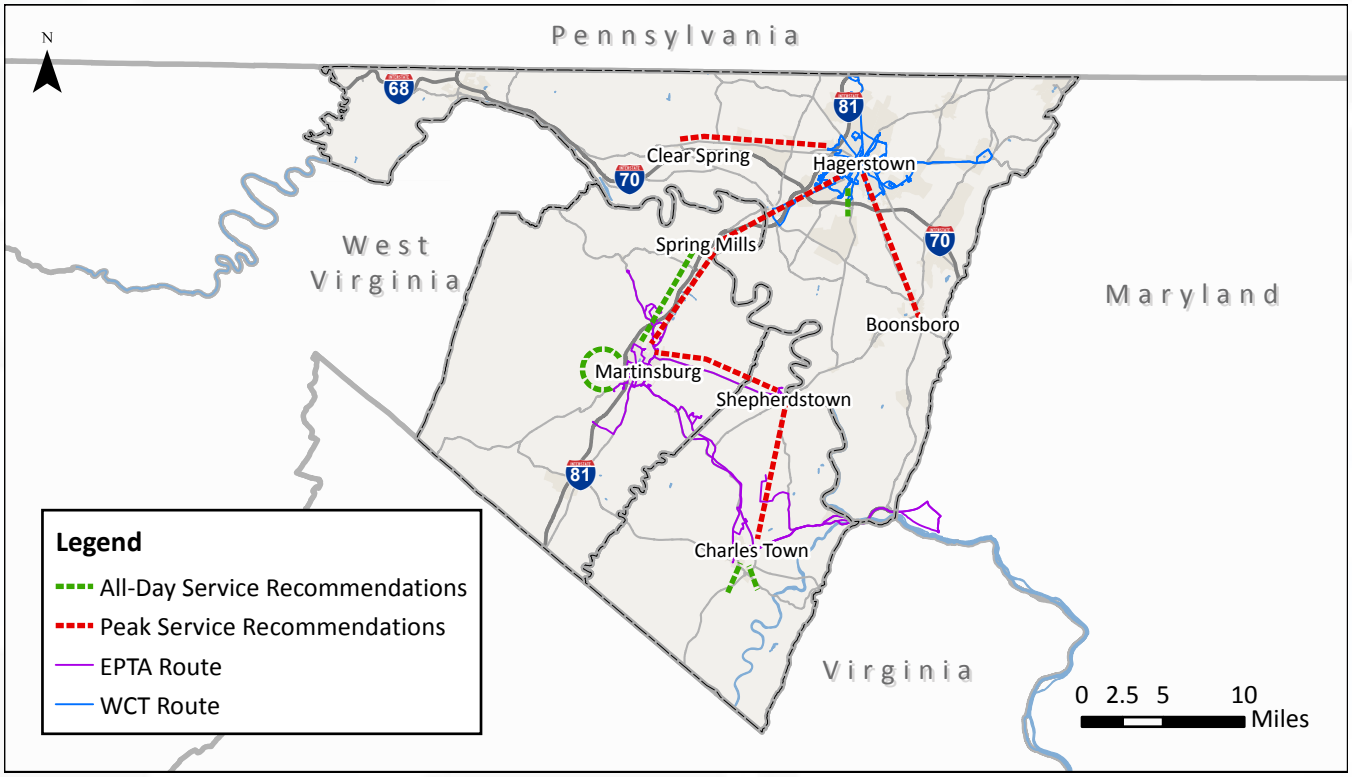


Figure 5-12: Transit Service Gap Recommendations

CAPITAL

Table 5-4 summarizes the total funding needs for both systems in order to continue to replace vehicles at the end of their useful life and implement the additional recommendations.

Table 5-4: Capital Needs by Agency

Cumulative Capital Cost by 2045	
EPTA	
Recommended Improvements	$6,189,356
Maintain Existing Fleet	$14,689,340
EPTA Total	**$20,878,696**
WCT	
Recommended Improvements	$3,821,178
Maintain Existing Fleet	$15,209,576
WCT Total	**$19,030,754**
Region Total	**$39,909,450**

In addition to vehicle replacements, there are several other capital projects planned for the HEPMPO region, including:

- **Northport Station:** a new MARC transit station and EPTA bus transfer center on the Jefferson Orchards property abutting Route 9 and the CSX railroad line. The station is proposed to replace the current Duffields Station. Cost: $12.6 to $16.3 million
- **EPTA Transfer Center and Garage/Administration Facility:** In conjunction with HEPMPO, EPTA conducted a transfer center relocation study in 2016 that identified potential sites to relocate the current transfer center located at the Caperton Transportation Center. The transfer center would also house EPTA's administration building and garage and maintenance facility. Cost: $14 million
- **EPTA Bus Shelters:** EPTA is implementing a bus shelter program, where eight to ten bus shelters would be installed at high ridership stops throughout the service area through 2023. Cost: $228,770
- **Washington County Mini-Hubs:** two new transfer points with enhanced passenger amenities at the Valley Mall and the Hagerstown Park and Ride/Sharpsburg Pike Walmart

COORDINATION STRATEGIES

There are several general coordination strategies that can ultimately improve transit services in the area. These strategies include:

- Coalitions to coordinate transportation and funding
- Common Fare Instruments
- Join Planning and Marketing
- One Call Center
- Joint Grant Applications
- Joint Training Programs
- Contracts for Service

FISCALLY-CONSTRAINED PLAN

Table 5-5 summarizes the total funding available for each agency versus the cost of the projected cost of the recommended services through 2045.

The operating costs take into account each agency's ongoing planning work to carry out the services outlined in this plan in addition to the development of regional transit services, updating route schedules, planning new routes to continue to fill gaps in the transit network, and updating Transit Development Plans. These efforts will continue through the course of the plan.

The assumptions used in generating these forecasts include:

- A 2.28% annual growth rate in operating costs, maintenance costs, and capital costs
- A 5% growth rate in funding through 2022, and a 2.28% growth rate from 2023-2045

These figures are based on funding guidance for the development of the Transportation Improvement Program (TIP) through 2022 (5 percent), and the average annual increase in the consumer price index for the greater Washington, DC region over the past 20 years (2.28 percent).

Given the financial constraints that exist, the majority of the improvements recommended for EPTA and WCT will not be able to be implemented without increases from existing funding sources or the identification of new sources.

Overall, additional capital funding will be necessary in order for the agencies to simply maintain their fleets, as the funding levels for vehicle replacements do not meet the needs projected based on each agency's vehicles' useful life. Additionally, the additional vehicles needed to expand service will need additional funding.

The preventative maintenance costs and funding are expected to be constrained through 2045, as adequate funding has been available for the past five years.

Table 5-5: Funding versus Costs Through 2045

Agency	Type	Subcategory	Costs	Funding	Surplus/Deficit
EPTA	Operating	Existing Services	$58,670,970	$64,717,798	$6,046,828
		Service Expansion	$46,392,726	0	-$46,392,726
	Maintenance	All	$13,785,495	$13,785,495	$0
	Capital	Vehicle Replacement	$14,689,340	$12,780,481	-$1,908,859
		Vehicles for Service Expansion	$6,189,356	$0	-$6,189,356
		Other	$14,427,645	$20,661,777	$6,234,132
WCT	Operating	All	$99,351,987	$100,987,098	$1,635,111
		Service Expansion	$24,061,363	0	-$24,061,363
	Maintenance	All	$11,608,937	$11,608,937	$0
	Capital	Vehicle Replacement	$15,209,576	$9,745,117	-$5,464,460
		Vehicles for Service Expansion	$3,821,178	$0	-$3,821,178
		Other	$721,000	$4,375,185	$3,654,185

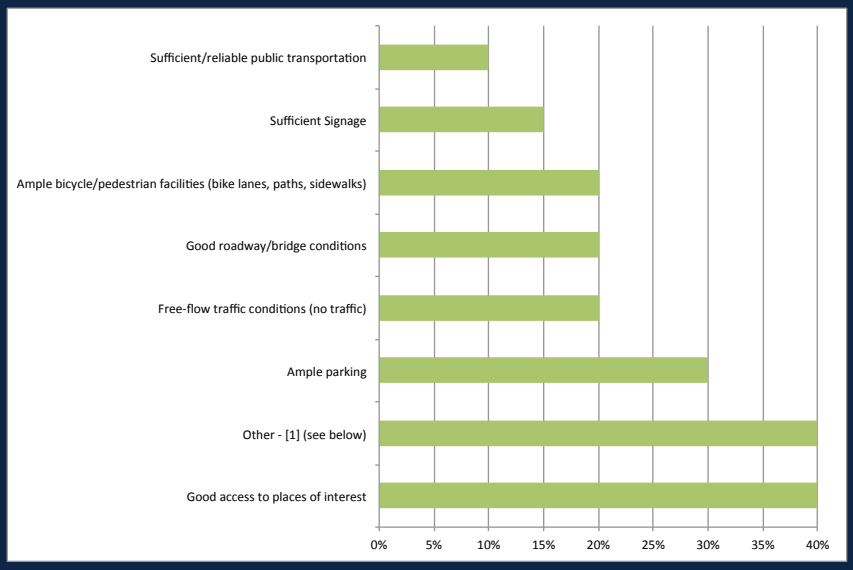
SIX CHAPTER TRAVEL & TOURISM

This chapter discuss travel and tourism, which were recently added as new planning factors under the FAST ACT. Direction2045 recognizes transportation's role in improving access to social and economic opportunities and proposes an objective to "enhance travel and tourism connectivity to regionally and nationally significant areas." The HEPMPO, home to national battlefields, parks, and trails; performing arts centers; stadiums; casinos; and other venues, depends on transportation connectivity and reliability in facilitating travel in, around, and through the region. This section summarizes some of the input received from stakeholders regarding travel and tourism needs and provides recommendations for ways in which to integrate tourism into transportation planning.

WHAT DO THE EXPERTS SAY?

The HEPMPO conducted a Travel & Tourism focus group survey to help understand the transportation concerns and needs of organizations who engage tourists on a daily basis. The survey was sent to local, state, and federal agencies; convention & visitors bureaus; regional airports; and prominent tourism venues. The survey received 24 responses and provided important insights into transportation needs in the HEPMPO region.

As illustrated in **Figure 6-1**, the focus group identified good access to places of interest (40% of respondents) and ample parking (30% of respondents) as the top two transportation strengths pertaining to travel and tourism.

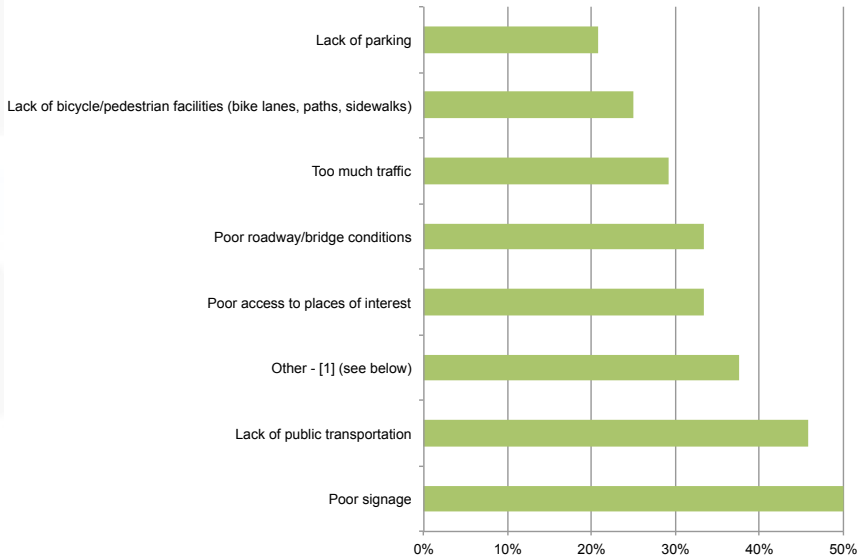


[1] Other specific issues that were identified by stakeholders included:

- *Free flow traffic, particularly for non-interstate travel*
- *Ample public transportation funding*

Figure 6-1: Perceived Transportation Strengths in the HEPMPO as they Pertain to Travel and Tourism

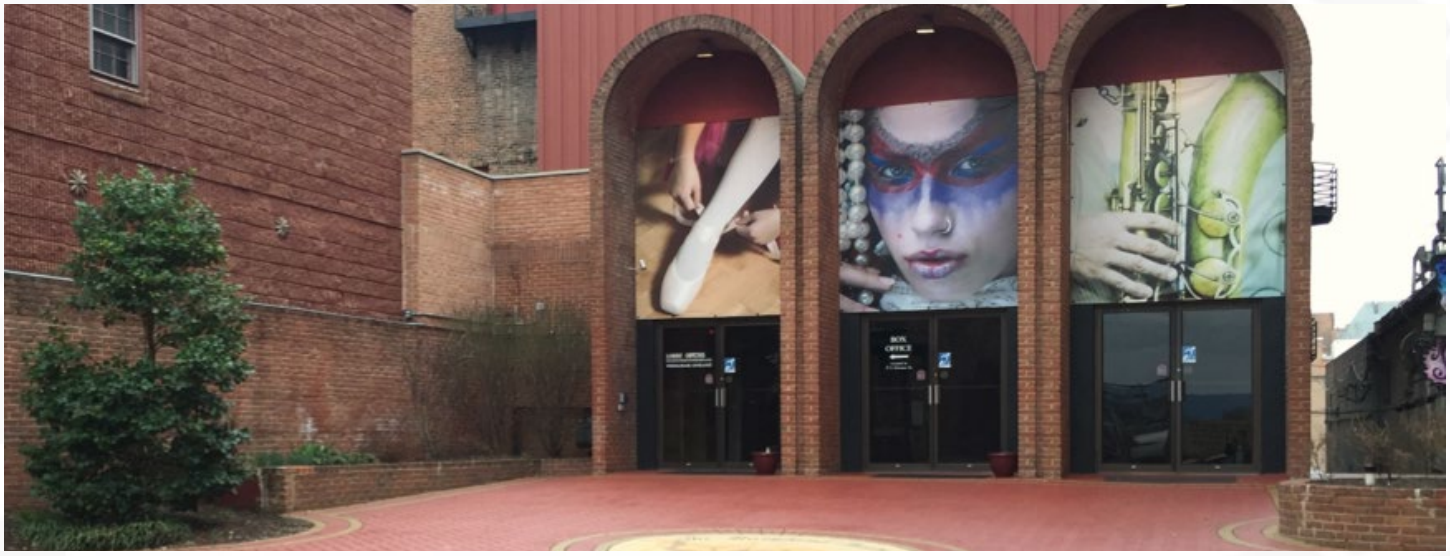
The focus group identified poor signage (50% of respondents) and lack of public transportation (46% of respondents) as the top two transportation barriers for travel and tourism in the HEPMPO region (**Figure 6-2**).



[1] Other specific issues that were identified by stakeholders included:

- *Lack of scenic overlooks along I-81*
- *Traffic congestion along I-81 and I-70*
- *Limited accessibility for people with limited mobility, particularly in places like Harpers Ferry*
- *Unattractive roadways*
- *Lack of tourism information, whether through signage or digital/print media, to places like the Washington County Museum of Fine Arts*

Figure 6-2: Perceived Transportation Issues in the HEPMPO as they Pertain to Travel and Tourism



The Maryland Theatre in Hagerstown's Arts & Entertainment district has approximately 100,000 annual visitors. Image Source: MBI.

Respondents also recommended specific locations for improvement. Several stakeholders recommended widening on I-81, particularly in Washington County. Other recommendations included:

- Invest in context-sensitive solutions on Maryland's Scenic Byways, such as the Historic National Road, the Chesapeake & Ohio Canal, and the Antietam Campaign trail. Prioritize bicycle and pedestrian improvements on these scenic corridors.
- Improve access and signage to Greenbriar State Park and the Appalachian Trail along National Pike (Route 40).
- Improve signage to the Washington County Fine Arts Museum, City Park, and places in Martinsburg.
- Improve signage on Route 40 to the University System of Maryland at Hagerstown (USMH) parking lots.
- Invest in resurfacing city streets.
- Invest in multimodal transportation (bicycle, pedestrian, transit).
- Reconfigure I-81 ramps in the City of Hagerstown. They are too close together.
- Pursue rail service between Hagerstown and Baltimore / Washington, D.C.
- Consider a paved overlook at Parks Gap off of Dry Run Road in Berkeley County. This would afford a fantastic view of the valley below and the historic City of Martinsburg.

The focus group also identified other plans or initiatives to boost tourism and travel to their communities or venues. Some of the possible plans and efforts include:

- Possible expansion of the Visitor Center on Route 340
- Signage for the Museum of Fine Arts along I-81 in Washington County and information about the museum at the West Virginia Welcome Center on I-81.
- The Cultural Trail in Hagerstown.

Finally, the survey asked the focus group if/when they would like to see autonomous (driverless) vehicles or shuttles used in their communities or at their facilities/venues. The majority (61%) believe that autonomous vehicles or shuttles could improve travel and tourism and 39% would like to see this change happen in the next 10 years (**Figure 6-3**).

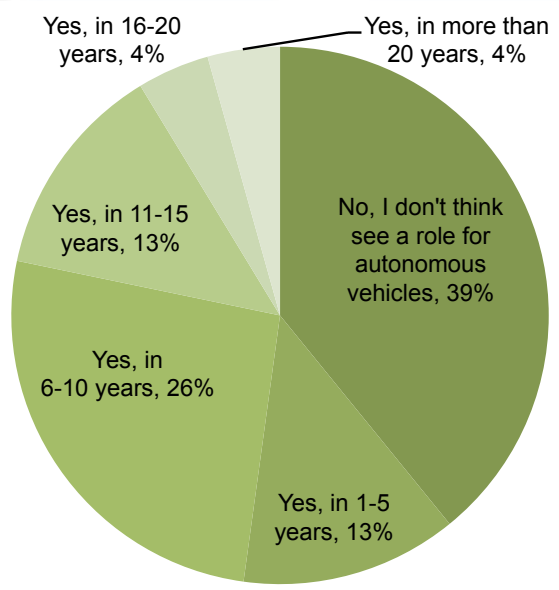


Figure 6-3: Input on Autonomous Vehicles and Travel and Tourism

The "Mural of Unusual Size" on the Hagerstown Cultural Trail. Source: Alex Brewer (Hense)

RECOMMENDATIONS

Based on the insights obtained through the focus group surveys, the following travel and tourism recommendations have been integrated into Direction 2045:

EXPLORE

Explore the possibility of an autonomous shuttle pilot program at Harpers Ferry, Antietam Battlefield, or at large regional shopping and entertainment centers, such as the Valley Mall and Hollywood Casino. The shuttles, like those used at National Harbor in Maryland, can introduce residents and visitors to emerging transportation technologies. In addition, they can potentially improve accessibility for those who are unable to drive or walk and help reduce the number of cars searching for parking.

Meet Olli, an autonomous shuttle tested at National Harbor, Maryland. Image Source: www.Nationalharbor.com

"GREEN"

"Green" the region's streets and parking lots through native vegetation. The green infrastructure can help reduce stormwater runoff while beautifying public spaces.

ENCOURAGE

Encourage context sensitive solutions in transportation planning, project development, and project selection. Encourage using natural materials, such as wood or stone, in the construction of walls, poles, and other supports for signs.

INVENTORY

Inventory the region's prominent tourism generators and continue coordinating with travel & tourism stakeholders to identify transportation barriers that could be addressed in future TIP and LRTP projects.

DEVELOP

Develop a wayfinding signage program to connect the C&O Canal Towpath and the Appalachian Trail to local communities, thereby capitalizing on long-distance cyclists and hikers. The Maryland State Highway Administration, in coordination with the City of Hagerstown and Washington County, has developed a signage plan of 140 new signs that would direct visitors to locations of interest. Figure 6-4 shows the signage plan for downtown Hagerstown.

Green infrastructure, like landscaped curb extensions (above), help reduce stormwater runoff while shortening roadway crossing distances for pedestrians. Source: MBI

INCORPORATE

Incorporate travel and tourism in the MPO's project prioritization processes

PROMOTE

Promote railbanking to preserve rail corridors for future use (rails to trails projects).

UTILIZE

Utilize the Federal Lands Access Program (FLAP) to help fund transportation projects that improve access to, are adjacent to, or are located within Federal lands. Projects are first screened based on whether they have support from the FLMA, StateDOT, and Facility Owner and then scored based on safety, accessibility & mobility, preservation, economic development, and environmental quality & sustainability. Visit the program screening criteria (Maryland and West Virginia) for additional detail and consult with the local, state, and FHWA representatives for more information.

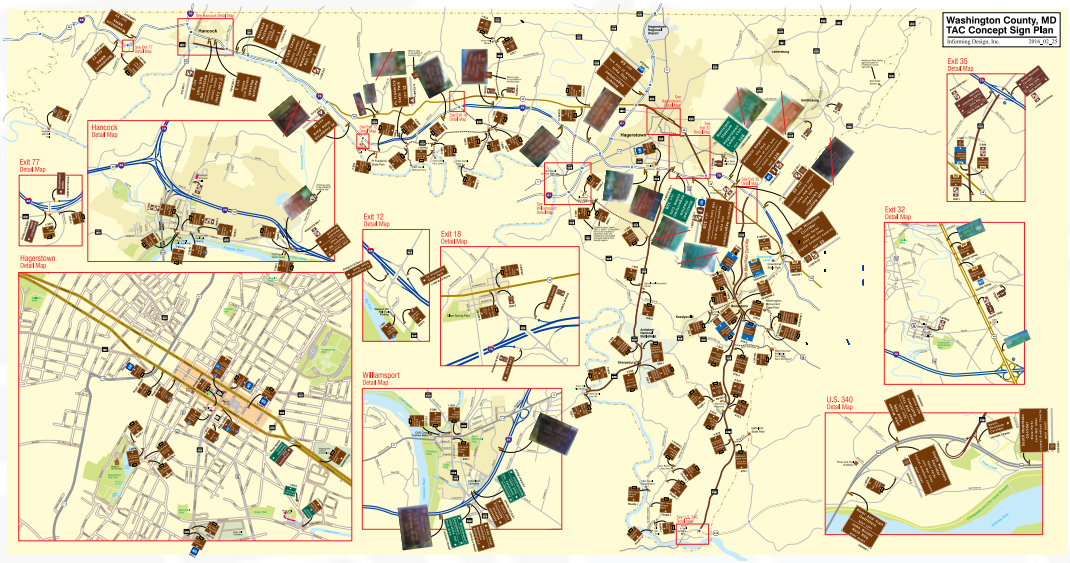


Figure 6-4: Washington County Tourism Signage Plan

SEVEN CHAPTER SAFETY

The nation lost 35,092 people in traffic crashes in 2015 (a 7.2 percent increase form 2014), ending a five-decade trend of declining fatalities (NHTSA FARS). Pedestrian and cyclist fatalities were the highest in 20 years, while motorcyclist deaths increased over 8 percent from the previous year. There were 520 roadway fatalities in Maryland in 2015 and 268 in West Virginia. The two states, in response to these alarming figures, established long-term goals of zero fatalities and set interim performance targets to help manage and accomplish this important goal.

This chapter reviews the West Virginia and Maryland highway safety performance targets, which were endorsed by the HEPMPO, and includes a preliminary crash analysis for Berkeley, Jefferson, and Washington counties as conducted by the HEPMPO.

RECENT INITIATIVES

West Virginia and Maryland recently adopted safety performance targets in accordance with the Federal Highway Administration (FHWA)'s five required Safety Performance Measures (fatalities, serious injuries, fatality rates, serious injury rates, and non-motorized fatalities and serious injuries). The HEPMPO endorsed these targets in Fall 2017. The targets, along with other safety initiatives, are discussed below.

WEST VIRGINIA

The Governor's Highway Safety Program (GSHP) and the West Virginia State Highway Safety Plan (SHSP) adopted a zero-fatality-long-term goal and established interim safety performance targets, which reflect 5-year rolling averages. West Virginia aims to reduce fatalities from 302 in 2016 to 267 in 2020, a 12% reduction (**Table 7-1**). In addition, WVDOT hopes to reduce non-motorized fatalities and serious injuries from 103 in 2016 to 85 in 2020, a 17% reduction.

Targets may have been established before 2016 crash records were available.

	2016	2017	2018	2019	2020
Fatalities	302	289	282	274	267
Serious Injuries	1,542	1,397	1,341	1,285	1,229
Fatality Rate	1.54	1.46	1.37	1.34	1.31
Serious Injury Rate	7.62	6.80	6.33	5.94	5.66
Non-motorized fatalities and serious injuries	103	99	94	90	85

Table 7-1: West Virginia Highway Safety Targets (Source: West Virginia GHSP)

As part of the Governor's Highway Safety Program, the WVDOT has been attending community events throughout the state. For example, in August 2017, the WVDOT setup highway safety booths at the Berkeley County Youth Fair (August 6-12) and the Jefferson County Fair (August 20-26). Education is a critical component of roadway safety and communities, like Ranson, are hosting their own events to help educate the community about safe cycling. See the Multimodal section for more information on Ranson's "Bike Rodeo" event (September 2017).

MARYLAND

Maryland recently adopted a Toward-Zero-Death (TZD) approach by developing interim targets to reduce fatalities from the five-year average (2004-2008) of 623 to 391 or fewer by December 31, 2020. The Maryland Strategic Highway Safety Plan (SHSP) includes annual performance targets (**Table 7-2**) to help reduce roadway fatalities and ultimately achieve a long-term goal of zero deaths.

Table 7-2: Maryland Highway Safety Targets (Source: Maryland SHA)

	2016	2017	2018	2019	2020	2030
Fatalities	442	429	416	403	391	296
Serious Injuries	3,422	3,294	3,171	3,053	2,939	2,272
Fatality Rate	0.72	0.70	0.68	0.66	0.64	0.53
Serious Injury Rate	6.08	5.86	5.64	5.43	5.23	4.04
Non-motorized fatalities and serious injuries	488	473	459	446	433	326

Targets may have been established before 2016 crash records were available.

Washington County recently joined the state to participate in the SHA's TZD initiative and developed a 2017-2022 Strategic Highway Safety Plan. The Plan identifies several focus areas, including:

- Distracted driving;
- Pedestrian and cyclist safety (primarily on Dual Highway);
- Aggressive driving (particularly on interstates);
- Lack of seat belts or other occupant protection;
- Impaired driving; and
- Highway infrastructure

As discussed in the Multimodal section, the City of Hagerstown recently worked with the HEPMPO to evaluate bicycle and pedestrian crashes from January 2015 to September 2017. The evaluation found that cyclists are involved in approximately one vehicle crash per month in the City and that cyclists are at fault in nearly half of the crashes. Visit the Multimodal section for more detail on bicycle and pedestrian safety.

Figure 7-1: Focus areas in the Maryland Strategic Highway Plan and Washington County Strategic Highway Safety Plan. Source: Maryland SHSP

CRASH ANALYSIS

West Virginia and Maryland statewide crash data were analyzed to help understand the patterns, density, and severity of crashes throughout the HEPMPO region. There has been an increase in crashes in the region since 2012 (**Figure 7-2**). This increase is particularly pronounced in Washington County, which has had increases in each of the past three years and 22% more crashes in 2016 than in 2013. Although there has been an increase in crashes in the region, 2016 was a five-year low in terms of fatalities per 100,000 people (**Figure 7-3**). The crash data was not only useful in identifying high crash corridors; the data was also used in the project prioritization process to award points to those projects that potentially improve safety in high crash areas.

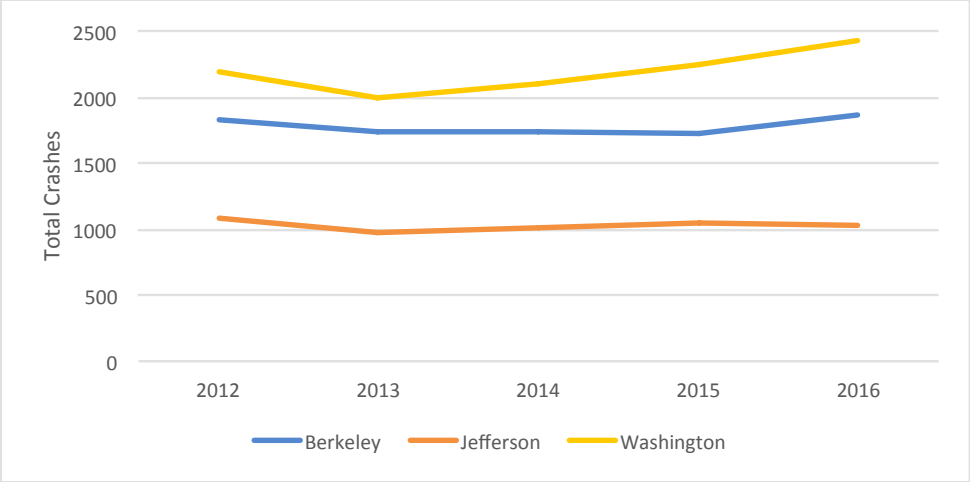


Figure 7-2: Crashes by County (2012-2016)

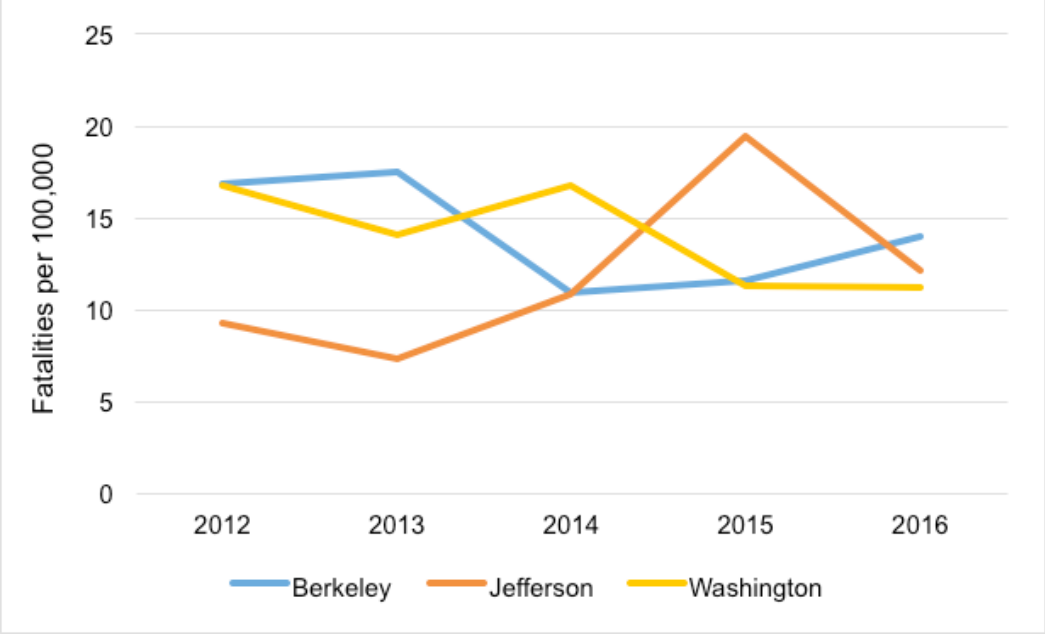


Figure 7-3: Crash Fatalities per 100,000 People (2012-2016)

Figure 7-4 shows crash locations and crash density from 2014 to 2016, with the highest concentrations of crashes shown in red. As evident in the map, the highest concentrations of crashes generally occurred in downtown areas and along prominent commercial corridors.

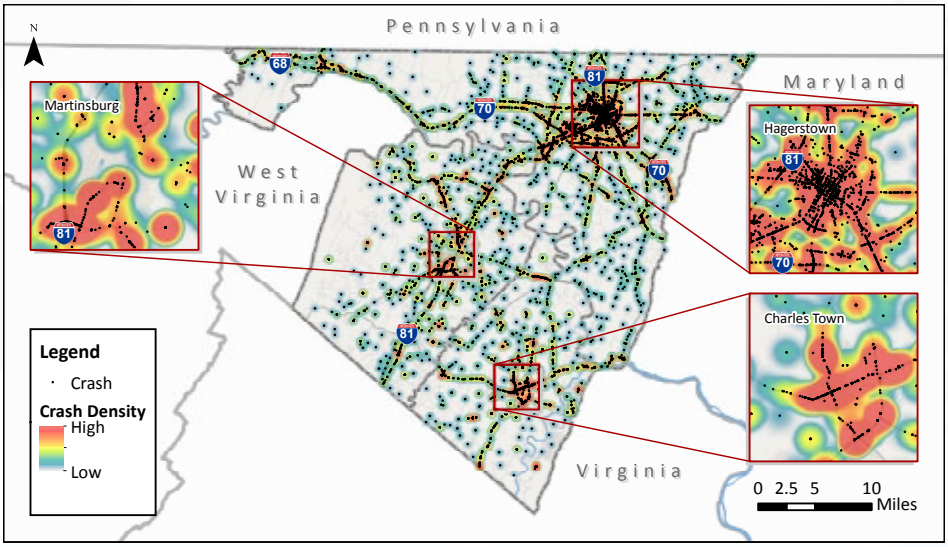


Figure 7-4: Crash Density (2014-2016)

Crash data and traffic volume data were combined in GIS for 2014-2016 to calculate corridor crash rates, the number of crashes per 100,000,000 vehicles miles traveled. The crash rates reflect the average number of annual crashes on a roadway segment, the length of that roadway segment, and the average number of daily vehicles on that segment. **Figure 7-5** shows the relative crash rates throughout the region. While Berkeley and Jefferson counties appear to have higher crash rates than Washington County, the West Virginia dataset includes a more extensive roadway network, which may visually skew the results.

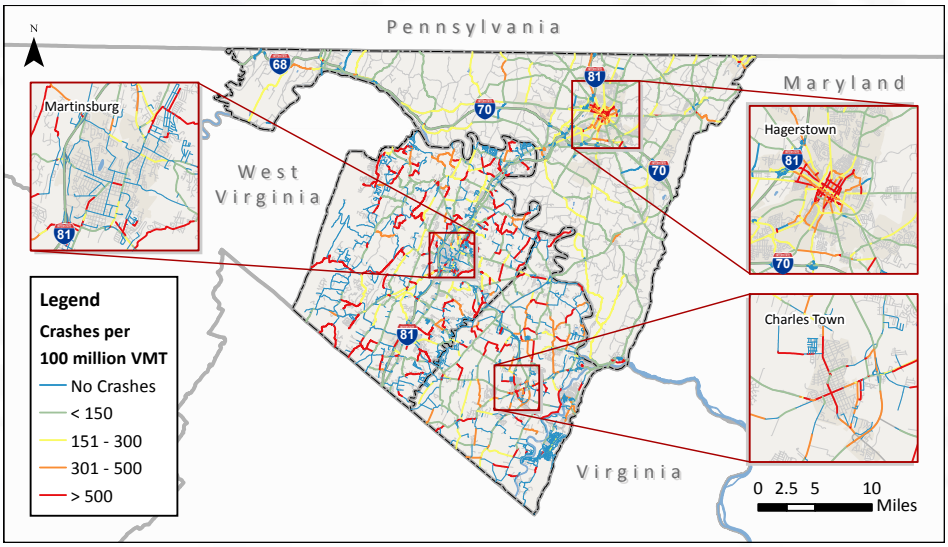


Figure 7-5: Crash Rates in the HEPMPO Region

While crash rates are a powerful indicator of crash frequency and traffic volumes, they do not account for crash severity at these locations. As such, GIS was used to identify corridors that have high crash rates and crashes involving injuries and/or fatalities. **Table 7-3** shows several high crash locations in Berkeley and Jefferson counties, while **Table 7-4** identifies several high crash locations in Washington County. These locations are meant to provide examples of high crash areas, both urban and rural, and do not represent an exhaustive list of regional safety concerns or needs. Further study is needed to evaluate the contributing factors to crashes at these locations and ultimately formulate recommendations to improve safety.

Table 7-3: High Crash Locations in Berkeley and Jefferson Counties

Facility	Location	Details	Crash Rate (Crashes per 100,000,000 VMT)
Route 45 (Apple Harvest Drive), from I-81 to US 11	Martinsburg	Dozens of crashes, 17 with injuries	861
Summit Point Road, from Shirley Road to Lloyd Road	Charles Town	Dozens of crashes, 13 with injuries (1 fatality)	1,183
Route 9 at the gas station (Priscilla Street)	Hedgesville	Dozens of crashes, 17 with injuries (2 fatalities)	2,820
Route 32, from Conklyn Way to Greenwalt Lane	Harpers Ferry	Dozens of crashes, 13 with injuries	2,251
Route 45 (Martinsburg Pike), from Venice Way to University Drive	Shepherdstown	Dozens of crashes, 15 with injuries (2 fatalities)	509
Route 51 (W. Washington Street), Mt. Parvo Avenue to Seminary Street	Charles Town	Dozens of crashes, 15 with injuries	1,072
North Mildred Street, from W. Beltline Avenue to Ambrose Drive	Ranson	Dozens of crashes, 19 with injuries	1,150

Table 7-4: High Crash Locations in Washington County

Facility	Location	Details	Crash Rate (Crashes per 100,000,000 VMT)
East Avenue, from N. Burhans Boulevard to Cannon Avenue	Hagerstown	Dozens of crashes, 11 with injuries	2,710
N. Locust Street, from Fairground Avenue to Route 40 (National Pike)	Hagerstown	Dozens of crashes, 9 with injuries (1 fatality)	1,005
Jonathan Street, from Pennsylvania Avenue to Route 40 (National Pike)	Hagerstown	Dozens of crashes, 5 with injuries	1,092
Oak Ridge Drive, from Downsville Pike to Westside Avenue	Hagerstown	Dozens of crashes, 10 with injuries	317
Foxville Road, from Smithsburg Pike to Hopkins Lane	Smithsburg	Dozens of crashes, 11 with injuries (1 fatality)	321

EIGHT CHAPTER PLANNING PERFORMANCE

Performance-based planning and programming has become a focus in the transportation community, as transportation agencies work to ensure that scarce resources are used effectively and transparently to achieve desired agency, regional, state, and national goals. The process involves a data-driven, strategic approach, providing for public and stakeholder involvement and accountability to make investment and policy decisions that attain desired performance outcomes for the multimodal transportation system. The FHWA has developed a guidebook to provide transportation agencies with useful information to help them establish a performance-based planning and programming process that leads to investment decisions that are based on performance information.

MAP-21 and the FAST Act have provided the impetus for several recent USDOT rulemakings requiring the monitoring and reporting of defined national performance measures for transportation. These requirements attempt to ensure that transportation investment decisions are made by their ability to support established goals for improving the overall system. At the MPO level, performance measures developed in cooperation with the state Department of Transportation (DOT) will be used to establish performance targets to track progress of attaining critical performance results. The measures address infrastructure condition (bridges and pavement), safety, system performance (traffic reliability), freight movement, and air quality.

FHWA Guidebook for Performance-Based Planning

The HEPMPO has worked to integrate many of these performance measure concepts into the development of Direction 2045. Some of the processes were first defined in HEPMPO's last plan update, Direction 2040. As new data sources and case studies continue to evolve, the HEPMPO will continue to integrate and enhance the performance-driven planning process. This plan includes the use of performance measures to monitor system conditions and the integration of quantitative measures in the region's project prioritization process (**Chapter 9**). This chapter addresses the federal transportation performance measures, evaluates overall performance of the identified project list, and presents system performance effects of several alternative land use and commuting scenarios.

A performance-based planning process continues to be emphasized by FHWA. New federal measures will need to be monitored and reported in MPO plans.

FEDERAL PERFORMANCE MEASURES

Federal surface transportation legislation, beginning with MAP-21 in 2012 and continued in the FAST Act, established performance requirements for states and MPOs under the Transportation Performance Management (TPM) program. These requirements cover:

- Gathering data for national performance measures;
- Performance target setting at the state and MPO level;
- Coordination between states and MPOs; and
- Reporting on performance at regular intervals.

In early 2017, FHWA finalized its TPM rules for infrastructure condition (bridges and pavements), system performance, freight movement and air quality. The rule for safety measures was finalized in March 2016. **Figure 8-1** highlights the performance measures under each rulemaking. The performance measures related to the Congestion Mitigation and Air Quality (CMAQ) program are not applicable to the HEPMPO since the region is in attainment of all current national air quality standards. The measures for bridge and pavement conditions relate to defined criteria using infrastructure condition data collected by each state DOT. System performance measures focus on travel time reliability measures that identify the variability of travel congestion between different time periods and days. These measures utilize travel time data from the National Performance Management Research Data Set (NPMRDS). Safety measures utilize accident data records maintained by each state DOT.

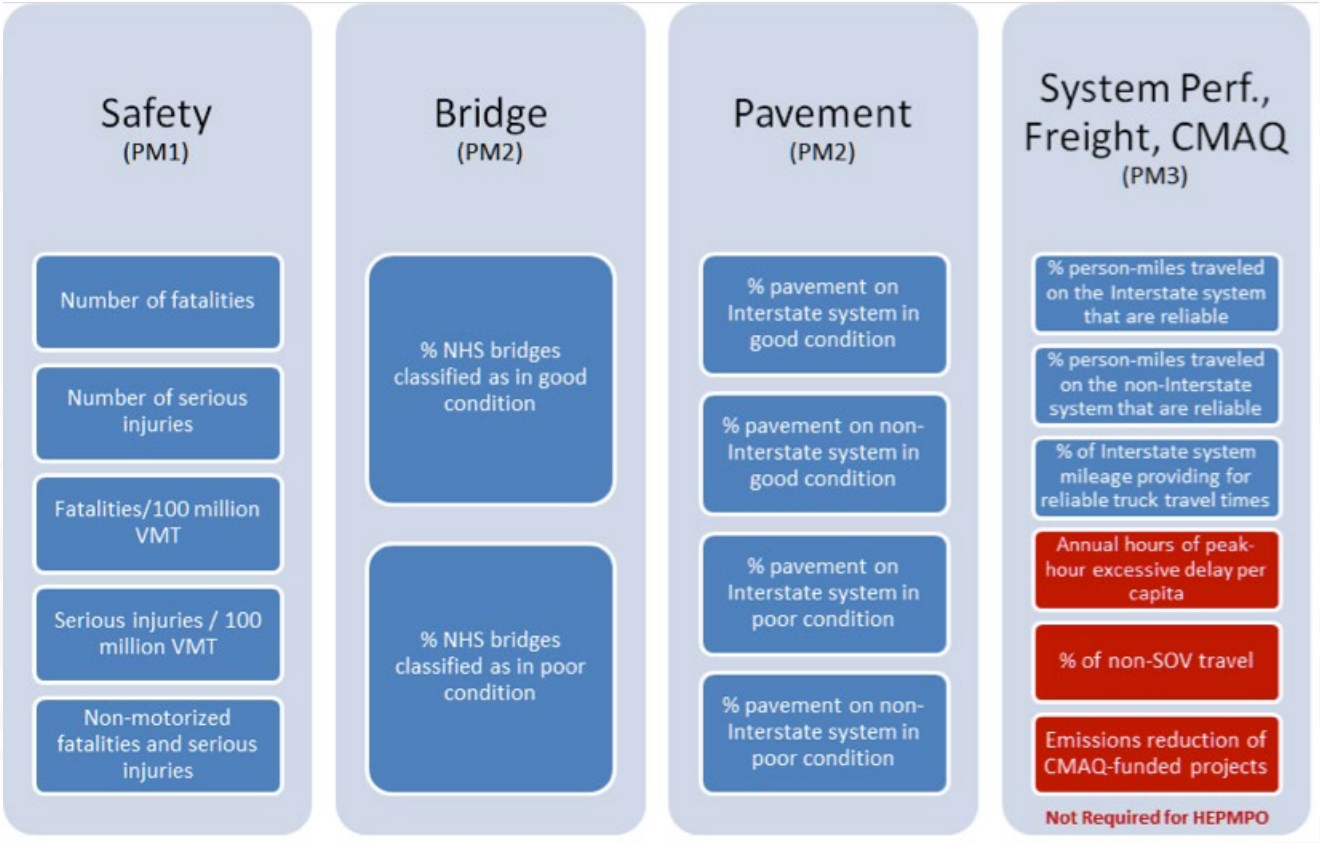


Figure 8-1: Federal TPM Performance Measures

The process to develop measures, identify targets and submit reports has been initiated by both MDOT and WVDOT. The final processes and targets for all FHWA performance measures are not expected to be completed until October 2018. As such, Direction 2045 has only included information available at the time of the plan development. Specific requirements for future adopted or amended LRTPs are summarized in **Table 8-1**.

Table 8-1: Applicable Dates for TPM Integration in LRTP

REQUIREMENT	Applicable Date for LRTP Integration
Document **safety and transit asset targets**, and include a systems performance report (SPR) that addresses safety performance measures (baseline, targets, impact of plan on ability to meet targets)	Adopted/amended after **May 27, 2018**
Document **all FHWA targets** and include an SPR that addresses all measures	Adopted/amended after **May 20, 2019**

Both MDOT and WVDOT have been making strides in various aspects of the MAP-21 and FAST Act requirements including development of a Transportation Asset Management Plan (TAMP), update of the Statewide Freight Plans, and the development of safety targets in the Highway Safety Improvement Program (HSIP). In August 2017, the MDOT's State Highway Administration (SHA) released a document providing a road map for MDOT and Maryland MPOs for addressing the TPM requirements. The document describes the details of the federal rulemaking on performance management, the role of MPOs, and various coordination aspects between each agency. **Table 8-2** highlights TPM requirements as provided in the SHA's road map.

Table 8-2: TPM Requirements as Documented in MDOT Road Map

TPM Requirements for Safety Vs. Other Measures		
	Safety	Infrastructure and System Performance
Initial Performance Period	2018, annually thereafter	2018-2022, every four years thereafter
Target Setting Frequency	Annually	Every four years (with adjustments optional at midpoint)
Applicability	All Public Roadways	National Highway System (NHS) & Interstates (varies across measures)
Reporting	HSIP Annual Report	Biennial Performance Reports
Reports Due	August 2017 Annually thereafter	Baseline – October 2018 Mid-period – October 2020 Full-period – October 2022 Every four years thereafter
Adjustments to Targets	Must be approved by FHWA	In the Mid Performance Period Progress Report (2 years after target establishment)

Figure 8-2 provides a summary of current MDOT and WVDOT information on each of the TPM measures. Both state DOTs have completed safety targets and chose to identify one statewide target for safety, and not to identify separate urbanized and non-urbanized targets. MDOT and WVDOT has conducted outreach to MPOs regarding the target setting process. Based on completed coordination efforts, the HEPMPO has chosen to support the identified DOT safety targets.

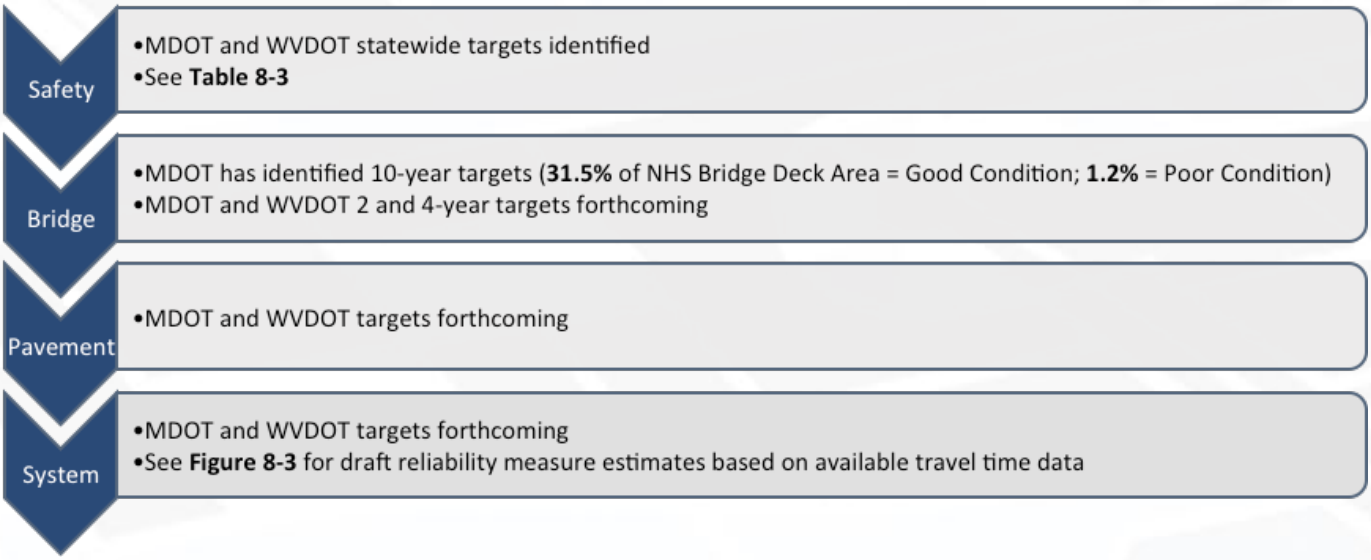


Figure 8-2: Federal TPM Performance Measures Status

In addition, MDOT has completed bridge performance targets. MDOT has completed ten year targets for the federal bridge measures that will also be included in the final TAMP. Two and four-year targets are also required for the biennial reporting of performance measures but have not been formally approved at this time. MDOT's goal is to maintain current bridge conditions; therefore, it is anticipated that the two and four-year targets will be the same as the ten-year targets. WVDOT is working to develop their bridge targets and both states continue efforts to address the pavement measure targets based on information in each state's bridge and pavement management systems.

Future efforts will focus on the continued coordination on target setting for the remaining performance measures. Each state DOT will then be responsible for the biennial reporting as described in the TPM requirements. These reports will include the baseline performance report, mid-period performance progress report, and the full-period performance progress report. These reports will be included in future LRTPs and other HEPMPO planning resources for public review. Each state will also be responsible for coordinating and collaborating with the HEPMPO. Although, WVDOT and MDOT have not developed system performance measure targets, the HEPMPO has reviewed annual travel time data (through mid-December 2017) using the Regional Integrated Transportation Information System (RITIS). This data are available for roads on the National Highway System (NHS). The HEPMPO regional measures for interstate, non-interstate, and truck travel time reliability are better than the Maryland and West Virginia statewide average values. Of particulate note, are the high values for intestate travel time reliability. However, an annual reliability value is only one measure for transportation performance and does not reflect typical daily traffic congestion, safety concerns, or the impact of incidents on traffic.

The HEPMPO has supported and adopted statewide safety targets identified by each DOT.

Table 8-3: MDOT and WVDOT Statewide Safety Targets

Safety Measure	Maryland					West Virginia				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Total Fatalities	442	429	416	403	391	302	289	282	274	267
Fatality Rate (Per 100M VMT)	0.72	0.70	0.68	0.66	0.64	1.54	1.46	1.37	1.34	1.31
Total Serious Injuries	3,422	3,294	3,171	3,053	2,939	1,542	1,397	1,341	1,285	1,229
Serious Injury Rate (Per 100M VMT)	6.08	5.86	5.64	5.43	5.23	7.62	6.80	6.33	5.94	5.66
Total Non-Motorized Fatalities and Serious Injuries	488	473	459	446	433	103	99	94	90	85

National Highway System (HEPMPO)

Estimated TPM System Measures from RITIS (Through December 17, 2017)			
Measure	HEPMPO	WV State	MD State
Interstate Travel Time Reliability	100%	69.5%	99.5%
Non-Interstate Travel Time Reliability	97.8%	82.6%	96.3%
Truck Travel Time Reliability Index	1.15	1.88	1.21

(Higher travel time reliability percentages = better performance)
(Lower truck travel time index values = better performance)

Figure 8-3: Draft Estimates of Traffic Reliability Measures for HEPMPO Region

OVERALL PERFORMANCE OF LRTP PROJECTS

As MDOT and WVDOT work to establish defined measures and targets, the HEPMPO will continue to work with local, regional and state partners to fund transportation projects that address regional goals and needs. **Chapter 9** highlights the project prioritization process that was used to select projects within the available funding constraints. That process included the evaluation of individual project performance across a variety of measures that relate directly to HEPMPO's goals and objectives for Direction 2045.

Future funding levels are unlikely to produce a completely problem-free transportation system. Indicators of productive transportation investments include improvements in travel efficiency and reductions in motorists' delay. The HEPMPO regional travel demand model has been used to perform an evaluation of the fiscally constrained plan as well as the unfunded projects that were identified in **Chapter 9**. Both VMT and vehicle hours of delay are used as the measures for the plan's transportation performance. The delay is a measure of the amount of time that is spent traveling at speeds below "free-flow" speeds throughout the roadway network. Within the model, the following roadway network scenarios are used for the evaluation:

- **2045 Existing + Committed (E+C) Network:** This network is the assumed baseline, to which other plan scenarios are compared. The scenario includes all completed projects and those currently identified on the region's TIP.
- **2045 Fiscally Constrained Network:** This network includes all projects that are funded within the fiscally constrained portion of the plan.
- **2045 Unconstrained Network:** This network includes all fiscally constrained and unfunded projects that have been identified in the unconstrained portion of the plan.

The identified projects in HEPMPO's long range plan could reduce regionally delay by nearly 60%. However, financial limitations prevent that impact from being realized.

As shown in **Figure 8-4**, the model results suggest that the region's fiscally constrained highway network itself will not have significant effects on regional VMT. Adding capacity to a roadway often draws additional traffic to that facility while simultaneously reducing traffic on the lower level facilities.

Although the projects are not focused on VMT reduction, other factors may have a significant impact on future VMT growth. As seen between 2008 and 2012, the economic downturn and rising fuel prices produced large VMT reductions. Other import factors affecting VMT include household decisions on where to work. The HEPMPO will continue to monitor regional VMT to see how these impacts play out over the next 5 to 10 years. Although not a significant component of the current plan, travel demand management (TDM) strategies (e.g. carpooling programs, staggered work hours, employee trip reduction programs, etc.), will be considered in future plan updates if VMT growth rates increase significantly.

Many of the projects in this plan are focused on capacity increases along congested roadways. As a result, the projects have a larger impact on vehicle delay as compared to VMT. **Figure 8-5** illustrates the travel model results for the fiscally constrained plan. The projects are forecast to reduce regional delay by over 10%, suggesting that the fiscally constrained projects will result in an increase to mobility in the region.

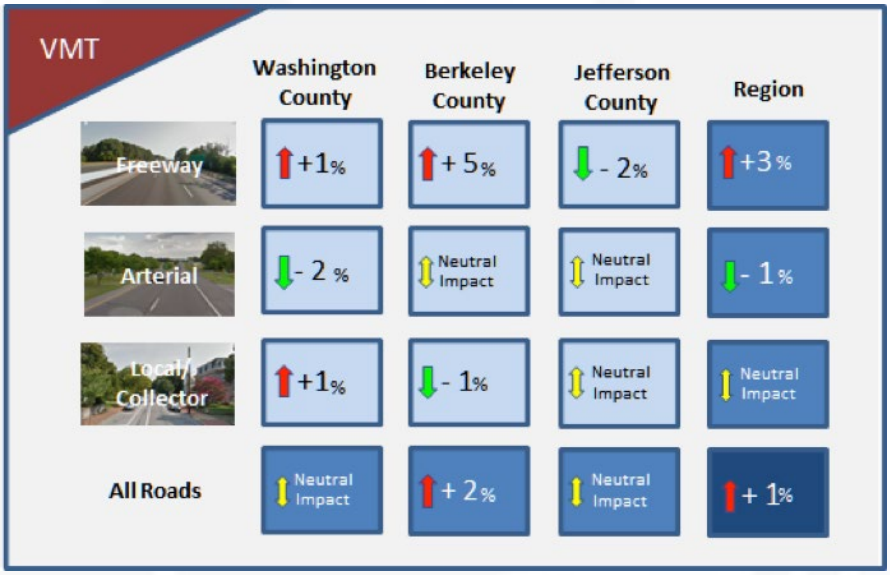


Figure 8-4: Vehicle Miles Traveled (VMT): 2045 Fiscally Constrained vs. 2045 E+C Network

Figure 8-5: Vehicle Hours of Delay: 2045 Fiscally Constrained vs. 2045 E+C Network

The minor delay improvements indicate that the Maryland and West Virginia highway funding streams are not sufficient to address many of the congestion problems in the region. This is further illustrated in **Figure 8-6**, which shows the delay impacts of the unconstrained project list as presented in **Chapter 9**. The inclusion of all identified projects in the travel model results in a much higher regional delay impact (e.g. 58.0% reduction), with the largest benefit in Washington County. The unconstrained projects include significant interstate projects in Washington (I-81, I-70) and Berkeley (I-81) counties. These projects provide significant reductions to delay in the region and provide some relief to parallel arterial roadways.

Figure 8-6: Vehicle Hours of Delay: 2045 Unconstrained Network vs. 2045 E+C Network

SCENARIO PLANNING PERFORMANCE

Scenario planning is a process that can help transportation professionals prepare for what lies ahead by providing a framework for developing a shared vision for the future through the analysis of various forces. Scenario planning can be used to support and advance the practice of performance-based planning and programming through the use of metrics, models, data sets, and tools to estimate and evaluate scenarios based on their ability to maximize system performance and support achievement of goals and performance targets.

HEPMPO has worked to define several conceptual scenarios to include in Direction 2045. This serves as a basis for further discussions and assessments with stakeholders during future plan updates. The scenarios have been developed to assess the potential impacts of land use and commuting behavior in relation to the transportation project impacts presented in the previous section.

FHWA has emphasized the integration of scenario planning concepts into MPO long range planning.

The two scenarios have been defined as follows:

1. There is an increased interest in urban living, which leads to a higher-than-expected growth in urban community types within the HEPMPO region.

2. There is an increase in commuting to/from neighboring states and counties consistent with trends that have occurred over the last decade in the HEPMPO region.

SCENARIO 1: INCREASED GROWTH IN URBAN AREAS

This scenario assessment included the development of an alternative land use vision for the region. **Chapter 2** provided household and employment forecasts (referred herein as the "2045 Baseline") based on a top-down approach that distributed projected county growth to areas within the region using input from local stakeholders and planned development locations. The goal of the alternative scenario was to reallocate the county growth to provide a greater concentration in more urban community types. To support this scenario, a process was conducted to define community types based on relative household and employment density as illustrated in **Figure 8-7**. The process included:

- Calculate household + employment per acre (density) for each travel model zone (TAZ)
- Assign a "Community Type" (1-5) to each TAZ based on its relative household and employment density
- Redistribute forecasted households & employment across community types

Figure 8-8 highlights the differences in household and employment distribution between the alternative land use scenario and the 2045 Baseline scenario used within the transportation needs assessment and modeling.

Figure 8-7: Defining Community Types based on Population and Employment Density

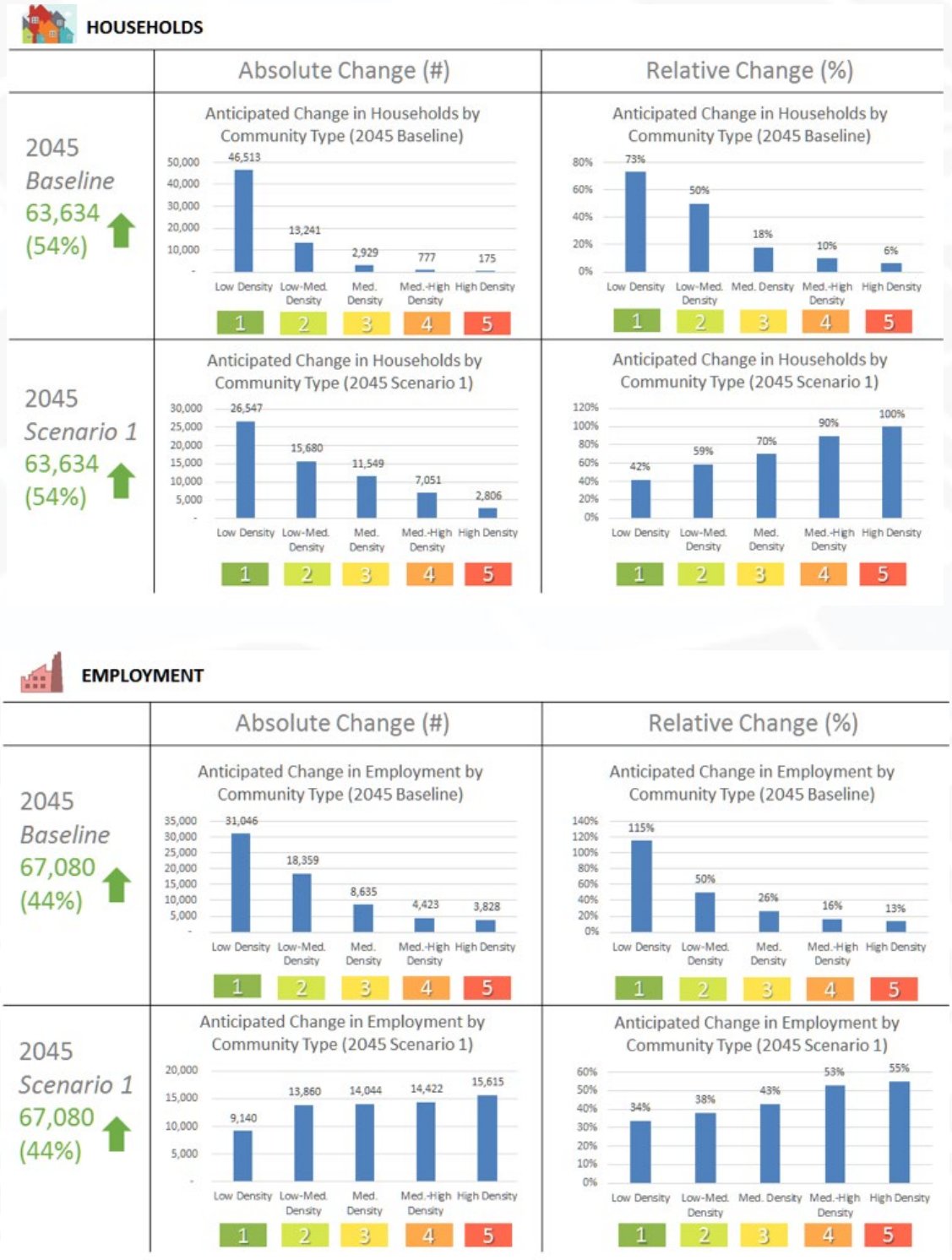


Figure 8-8: Comparison of Alternative Land Use Scenario to 2045 Baseline Used in Chapter 2

The alternative scenario explores the possibility that people will have an increased interest in "urban" living. However, the net 2045 population does not change in this scenario as compared to the baseline. Instead, the population has been reallocated in the region by community type to provide higher growth rates in higher density community types. For example, the baseline predicts that 777 more people will live in Medium-High density areas (orange) in 2045 as compared to current conditions. Meanwhile the alternative scenario forecasts much higher growth, estimating that 7,000 additional people will live in Medium-High density areas in 2045 as compared to current conditions.

Land use distribution can have greater impacts on regional VMT than transportation projects.

The alternative land use scenario was integrated into the HEPMPO regional travel demand model to identify potential impacts on travel performance measures including VMT, vehicle hours of travel (VHT) and delay. As summarized in **Table 8-4**, the results indicate that land use distribution can have greater impacts on regional VMT than transportation projects. Reduced travel reduces fuel usage, improves air quality, and benefits regional traffic congestion. However, the overall reduction in travel delay is not nearly as significant as the transportation project benefits provided in the previous section (e.g. 10% for the fiscally constrained projects). Growth management, including transit-oriented and mixed-use development, could contribute to more significant reductions in VMT, VHT, and delay. Those scenarios may be considered for future testing and assessment within the HEPMPO region.

Table 8-4: Scenario 1 Alternative Land Use Forecast Impact on Regional Travel Performance

Measure (Daily)	2045 Baseline	2045 Alternative Scenario	Difference	Percent Difference
VMT	13,019,162	12,817,398	-201,764	-1.5%
VHT	342,825	336,060	-6,764	-2.0%
Delay	156,291	154,392	-1,898	-1.2%

SCENARIO 2: INCREASED COMMUTING AND TRAVEL TO AREAS OUTSIDE HEPMPO REGION

Regional travel patterns have changed significantly over the last 20 years within the HEPMPO region. The U.S. Census Longitudinal Employer-Household Dynamics (LEHD) program integrates quarterly employment and wage data with other information from Census surveys. From the data, the program creates statistics on employment, earnings, and job flows at detailed levels of geography. Based on the LEHD reports, **Table 8-5** highlights some of the changes in commuting for those who reside in counties within the HEPMPO region between 2002 and 2015.

Table 8-5: Percentage of Residents Who Commute to Areas Outside of HEPMPO 3-County Region

County	% in 2002	% in 2015	% Change (2002-2015)
Washington	43.6%	46.2%	+ 6%
Berkley	46.0%	55.3%	+ 20%
Jefferson	27.5%	38.3%	+ 39%

The LEHD data illustrates some significant increases (over the 13-year period) in travel to areas outside the HEPMPO region, especially in the West Virginia counties. For the forecast modeling analyses presented in **Chapter 2**, the flows to and from the HEPMPO region were based on an assessment of traffic volume growth at each external station (roadway location at border), based on either historical trend data or average growth rates by roadway functional class. In addition, the modeling used 2016-2017 GPS data from Streetlight, Inc. to assess the percentage of the traffic that traveled completely "through" the region versus that to or from areas within the HEPMPO region.

This scenario assessment updated the regional travel model to assume more of the traffic growth at each border location was attributed to travel to or from the region. The overall growth rates were not changed (as in many cases they represented significant levels of growth); however, less of the growth was attributed to travel going "through" the entire region. As a result, this scenario increases the travel interactions between residential areas within the 3-county region to areas outside the HEPMPO.

Table 8-6 provides the impacts of this scenario travel change on VMT, VHT and delay. Continued trends in increased travel

Increased commuting to areas outside the HEPMPO region can have significant impacts on local traffic and congestion.

to areas outside the HEPMPO region will provide benefits to regional VMT and delay. However, this will most likely come at the expense of the economic robustness of the cities and towns. An assessment of the model results indicates less travel to Hagerstown and Martinsburg, reducing the traffic within the downtown areas. However, more demand will be placed on the regional freeways including I-81, I-70 east of I-81, and US 340. While overall delay is reduced, some existing areas of traffic congestion may be expected to worsen, especially at US340.

Table 8-6: Scenario 2 Impact on Regional Travel Performance

Measure (Daily)	2045 Baseline	2045 Alternative Scenario	Difference	Percent Difference
VMT	13,019,162	12,720,457	-298,705	-2.3%
VHT	342,825	336,621	-6,204	-1.8%
Delay	156,291	150,011	-6,280	-4.0%

The above trends are illustrative and should not be regarded as a potential strategy for VMT or delay reduction. The economic conditions in Hagerstown and Martinsburg will be important to ensure continued growth and jobs for individuals. The scenarios serve as an illustrative analysis to identify potential transportation impacts if past commuting trends continue. The HEPMPO will continue to monitor these trends using available data.

CHAPTER NINE
2045 LONG RANGE PLAN

Direction 2045 anticipates approximately $412 million in funding over the plan's 23-year horizon (2023-2045), a $191 million reduction from Direction 2040, the region's previous long-range plan. Meanwhile, the Direction 2045 "vision" (or unconstrained) projects are expected to cost nearly $6.3 billion, far exceeding the anticipated funding. As such, Direction 45 relied on local input and a robust prioritization process to identify the most important projects – projects that maximize benefits and are within budget (fiscal constraint).

This chapter identifies existing + committed projects, reviews available funding, highlights proposed projects, documents the project prioritization process, and discusses the fiscally constrained plan.

EXISTING + COMMITTED PROJECTS

Prior to evaluating projects and formulating project recommendations, it is important to understand the existing roadway network and the committed projects that have dedicated funding source(s). These proposed projects with anticipated funding allocations comprise the existing + committed (E+C) network.

The E+C projects were primarily identified by referencing the region's FY 2017-2020 Transportation Improvement Program (TIP) and the Statewide Transportation Improvement Program (STIP), both of which list short-term funded projects through 2022. Stakeholder meetings, particularly with state agencies, were also extremely helpful in finalizing the E+C network. It is anticipated that the E+C projects will be in some stage of construction by the end of FY 2022. As such, the estimated E+C project costs do not count against the anticipated budgets for this plan since the plan's funding extends from 2023 to 2045. The E+C projects are shown in **Table 9-1**.

Table 9-1: Existing + Committed (E+C) Projects

TIP ID #	Project Name	Cost (YOE $)	County
B2010-05	East Burke Street Bridge	$1.6M	Berkeley
B2010-11	Gerrardstown Bridge	$.9M	Berkeley
B2014-02	Oak Street Bridge	$1.3M	Berkeley
B2014-05	North High St Traffic Signal	$.8M	Berkeley
B2014-08	I-81 Bridge over Potomac River	$39.1M	Berkeley
B2014-13	Broad Lane Improvements	$.5M	Berkeley
B2014-14	Campus Drive RTL	$.3M	Berkeley
B2011-09	Inwood Bypass	$10.8M	Berkeley
B2016-04	Martinsburg Signal System	$1.8M	Berkeley
B2016-07	Marlowe I/C Improvements	$.8M	Berkeley
B2016-08	Tavern Road Railroad Crossing	$.1M	Berkeley
B2017-02	Rock Cliff I/S Improvements	$.6M	Berkeley
B2017-01	Nadenbousch Lane Signal	$.2M	Berkeley
B101.1	I-81 - Phase 1	$75.0M	Berkeley
B111.0	WV 51	$14.7M	Berkeley
J2014-04	Citizens Way Intersection Improvements	$.9M	Jefferson
J2016-02	Charles Town CBD Signal System	$1.0M	Jefferson
J2016-03	Bakerton Road Bridge	$1.0M	Jefferson
J2008-08	US 340 South of Charles Town	$60.0M	Jefferson
J102.1	US 340 - Phase 1 -Operational Improvements	$11.0M	Jefferson
J405.1	Rockwool Blvd. - Phase X	$2.2M	Jefferson
W2009-01	WM Railway Lift Bridge Restoration	$2.2M	Washington
W2017-07	Garis Shop Road Bridge	$1.8M	Washington
W2017-07	Crystal Falls Drive Bridge	$1.6M	Washington
W2017-07	Keedysville Road Bridge	$1.5M	Washington
W2017-07	Poffenberger Road Bridge	$2.0M	Washington
W2017-07	Old Roxbury Road Bridge	$3.1M	Washington
W2017-07	Halfway Boulevard Bridges	$2.1M	Washington
W2017-08	Eastern Boulevard Widening Phase II	$5.3M	Washington
W2017-01	Paramount Elementary School Safe Routes To School (in design)	$.5M	Washington
W2014-09	I-81 Widening and Bridge Rehabilitation	$71.3M	Washington
W2016-01	Crayton Boulevard - Phase I	$3.3M	Washington
W2017-11	Colonel Henry K. Douglas Drive Extended Phase 1	$3.2M	Washington
W2014-01	I-70 Interchange Improvements at MD 65 - PE	$1.5M	Washington

ANTICIPATED FUNDING

Financial planning plays a critical role in the transportation planning process and is intended to ensure that plans are based on a reasonable expectation of sufficient revenues to support transportation system expansion. This financial assurance, known as "fiscal constraint", is required by federal regulations and must ultimately be in "year-of-expenditure dollars".

There is less funding available for Direction 2045 than there was for Direction 2040, the region's last long-range plan (**Table 9-2**)[1]. This reduction in anticipated funding is particularly pronounced in Washington County, which had $349 million in available funding for Direction 2040 and only $193 million for Direction 2045, a reduction of $156 million (in 2017 dollars). This reduction is primarily due to decreases in state funding.

Table 9-2: Funding Expectations for Direction 2040 (the previous plan) and Direction 2045

	Berkeley and Jefferson Counties, West Virginia (2017 Dollars)	Washington County, Maryland (2017 Dollars)
Direction 2040	$254 million	$349 million
Direction 2045	$219 million ($35 million)*	$193 million ($156 million)**

** Funding includes anticipated system expansion funds from WVDOT, but does not include new WV State Roads to Prosperity Highway Program Bond.*
*** Includes anticipated system expansion funds from MDOT, Washington County, and the City of Hagerstown*

The following section documents the anticipated available funding for Berkeley, Jefferson, and Washington counties over the Plan's 23-year horizon (2023-2045). Pursuant to Federal guidelines, the funding expectations are discussed in year-of-expenditure dollars.

WEST VIRGINIA

West Virginia's entire public roadway system, with the exception of some municipal streets/bridges and subdivision roadways, is maintained and operated by WVDOH; therefore, the state-level funding analysis is the basis for the fiscal constraint in Berkeley and Jefferson counties. WVDOH generates a projection of total available funding based on historic revenues and then identifies the share of projected revenues that would be needed for "non-improvement" categories including administration, routine maintenance, equipment, earmarks, etc.

The projected system expansion funds are distributed to MPOs based on the historical shares of expansion funds. In the case of the HEPMPO region, this share is 8.85%, a 0.63% share increase from the Direction 2040 allocation.

Federal regulations require that anticipated funding (or revenue) is in "year of expenditure" (YOE) dollars, meaning that revenues must be inflated to future years of expenditure. The total anticipated system expansion funding for Berkeley and Jefferson counties is $219 million (in 2017 dollars) or $429.8 million (in YOE dollars). A 4.3% annual inflation rate was used to calculate "year of expenditure" revenues for Berkeley and Jefferson counties. **Table 9-3** shows this year-of-expenditure forecast, the results of which were ultimately compared to anticipated project costs.[2]

[1] *Note: Direction 2040 and Direction 2045 each have 23-year planning horizons.*
[2] *The 4.3% inflation rate was based on guidance from the WVDOH's Long Range Revenue Estimates for Use in MPO Long Range Transportation Plans.*

Table 9-3: Year of Expenditure (YOE) Forecasts for System Expansion Funding (Berkeley and Jefferson Counties)

	Fiscal Year	Total Revenue (YOE $)
PHASE 1: Post TIP Short Term (2023-2030)	2023	$9.5M
	2024	$11.8M
	2025	$12.3M
	2026	$12.9M
	2027	$13.4M
	2028	$14.0M
	2029	$14.6M
	2030	$15.2M
PHASE 2: Post TIP Long Term (2031-2045)	2031	$15.9M
	2032	$16.6M
	2033	$17.3M
	2034	$18.0M
	2035	$18.8M
	2036	$19.6M
	2037	$20.5M
	2038	$21.4M
	2039	$22.3M
	2040	$23.3M
	2041	$24.3M
	2042	$25.3M
	2043	$26.4M
	2044	$27.5M
	2045	$28.7M
	Subtotal	**$429.8M**

MARYLAND

In Maryland, MPO funding projections reflect state and local funding sources. The **Hagerstown/Eastern Panhandle Metropolitan Planning Organization Regional Transportation Plan Financial Projections for Washington County (June 2017)**, developed by the MDOT Finance Office, provides the state funding projections based on a historical analysis of surface transportation funds. Meanwhile, the Washington County and City of Hagerstown funding estimates are based on the **Capital Improvement Program (CIP)** and conversations with local officials.

The projected statewide system expansion funds are distributed to the Maryland MPOs based on historical shares of expansion funds. The share for Washington County, in the HEPMPO, is 0.7%, a 0.1% reduction in share from the last plan (Direction 2040). The total anticipated system expansion funding for Washington County is $193.0 million (in 2017 dollars) or $226.9 million (in YOE dollars). A 5.3% annual inflation rate was used to calculate the "year of expenditure" revenues.[3] **Table 9-4** shows the year-of-expenditure forecast for Washington County, with contributions from MDOT, Washington County, and City of Hagerstown.

Table 9-4: Year of Expenditure (YOE) Forecasts for System Expansion Funding (Washington County)

	Fiscal Year	State Revenue (YOE $)	Washington County Revenue (YOE $)	Hagerstown Revenue (YOE $)	Total Revenue (YOE $)
PHASE 1: Post TIP Short Term (2034-2030)	2023	$3.7M	$4.6M	$.3M	$8.6M
	2024	$3.6M	$6.5M	$.3M	$10.4M
	2025	$3.8M	$6.8M	$.3M	$11.0M
	2026	$4.0M	$7.2M	$.4M	$11.5M
	2027	$4.3M	$7.6M	$.4M	$12.2M
	2028	$4.5M	$8.0M	$.4M	$12.9M
	2029	$4.7M	$8.4M	$.4M	$13.5M
	2030	$5.3M	$8.8M	$.4M	$14.6M

[3] The 5.3% inflation rate was based on guidance from the Hagerstown/Eastern Panhandle Metropolitan Planning Organization Regional Transportation Plan Financial Projections for Washington County (June 2017).

Table 9-4: Year of Expenditure (YOE) Forecasts for System Expansion Funding (Washington County) (continued)

	Fiscal Year	State Revenue (YOE $)	Washington County Revenue (YOE $)	Hagerstown Revenue (YOE $)	Total Revenue (YOE $)
PHASE 2: Post TIP Long Term (2031-2045)	2031	$6.0M	$9.3M	$.5M	$15.8M
	2032	$6.8M	$9.8M	$.5M	$17.1M
	2033	$7.5M	$10.3M	$.5M	$18.3M
	2034	$8.4M	$10.9M	$.5M	$19.8M
	2035	$9.2M	$11.4M	$.6M	$21.2M
	2036	$10.2M	$12.0M	$.6M	$22.8M
	2037	$11.2M	$12.7M	$.6M	$24.5M
	2038	$12.2M	$13.4M	$.7M	$26.2M
	2039	$13.3M	$14.1M	$.7M	$28.1M
	2040	$14.5M	$14.8M	$.7M	$30.1M
	2041	$15.8M	$15.6M	$.8M	$32.2M
	2042	$17.2M	$16.4M	$.8M	$34.4M
	2043	$18.7M	$17.3M	$.9M	$36.9M
	2044	$20.2M	$18.2M	$.9M	$39.3M
	2045	$21.8M	$19.2M	$1.0M	$41.9M
	Subtotal	**$226.9M**	**$263.3M**	**$13.2M**	**$503.4M**

LONG RANGE "VISION" PROJECTS

Direction 2045 includes an extensive list of unconstrained (or "vision") projects. The projects, ranging from minor intersection improvements to significant widening efforts, represent a "needs list" of projects. Due to funding limitations, only a select number of projects are included in the Direction 2045 fiscally constrained plan. The projects were identified through a collaborative engagement effort of city, county, MPO, and state representatives. The projects were nominated based on the following input:

- Review and discussion of forecast deficiencies from travel demand modeling and congestion analyses;
- Projects from city and county plans and studies;
- Evaluation of safety concerns;
- Projects identified from previous long range planning efforts;
- Statewide priorities and needs; and,
- Input from stakeholder and public concerns.

The vision projects, shown in **Table 9-5, Table 9-6,** and **Table 9-7** for Berkeley County, Jefferson County, and Washington County, respectively, include planning-level cost estimates (2017 dollars) that were derived from several sources, including: Capital Improvement Plans (CIPs); the Maryland Highway Needs Inventory; and the Direction 2045 team. The projects can also be viewed in this interactive web-map.

Table 9-5: Berkeley County Unconstrained (Vision) Projects

Proj. ID	Facility	Description	From	To	Cost (2017)
B101.2	I-81 - Phase 2	Widen to six lanes	Exit 8 / WV32	Exit 5 / WV51	$72.0M
B101.3	I-81 - Ph.3	Widen to six lanes	Exit 5 / WV51	Virginia	$105.9M
B102.0	US 11	Intersection improvements	Edwin Miller Blvd.	Falling Waters	$29.4M
B103.0	US 11	Intersection improvements	Virginia	Tabler Station Rd.	$17.4M
B104.0	US 11	Widen to four lanes	Tabler Station Rd.	WV 45/9	$41.8M
B105.0	WV 9	New four-lane alignment	Morgan County	CR 1	$30.1M
B106.0	WV 9	Widen to six lanes	CR1	Industrial Park	$9.9M
B107.0	WV 45	Widen to six lanes	I-81	WV 9 (Queen St.)	$8.4M
B108.0	WV 45	Intersection improvements	WV 9	Shepherdstown	$13.6M
B109.0	WV 45	Widen to four lanes (divided)	WV 9	Shepherdstown	$144.2M
B110.0	WV 45	Roadway reconstruction, safety improvements	I-81	WV 51	$87.3M
B112.0	WV 51	Intersection improvements	Gerrardstown	I-81	$7.6M
B113.0	WV 901	Widen to four lanes	Ramps from I-81 South	CR 1	$38.9M
B201.0	CR 1	Widen to four lanes	WV 9	WV 901	$87.1M
B202.0	Giles Mill Rd. Bridge	Widen to two Lanes	Giles Mill Rd.		$1.3M

Table 9-5: Berkeley County Unconstrained (Vision) Projects (continued)

Proj. ID	Facility	Description	From	To	Cost (2017)
B203.0	Novak Rd.	Intersection Improvements	US 11	Novak Rd.	$7.6M
B204.0	WV 115 / Charles Town Rd. / Baker Heights Rd.	Intersection Improvements	WV 115	Baker Heights Rd.	$.7M
B301.0	Commercial Rd. Connector	Construct new roadway	Delmar Orchard Rd.	Proposed Commercial Dr.	$2.0M
B302.0	Delmar Orchard Rd.	Two-lane reconstruction	Klee Dr.	W. King St.	$22.7M
B303.0	East-West Connector	Construct new roadway	Klee Dr.	Proposed Commercial Dr.	$4.9M
B304.0	King St.	Intersection improvements	I-81	US 11	$4.6M
B305.0	Lutz Ave. Extension	New two-lane roadway	Existing Lutz Ave.	Raleigh St. Ext.	$4.1M
B306.0	Main Residential Rd.	Construct new roadway	Residential loop connecting	Delmar Orchard Rd.	$13.6M
B307.0	North-South Connector	Construct new roadway	Proposed East-West Connector	Proposed Klee Dr.	$2.0M
B308.0	Raleigh St. / Race St.	Intersection Improvements	Raleigh St.	Race St.	$.4M
B309.0	Residential through Road	Construct new roadway	Arden-Nollville Rd.	Delmar Orchard Rd.	$10.0M

Table 9-6: Jefferson County Unconstrained (Vision) Projects

Proj. ID	Facility	Description	From	To	Cost (2017)
J101.0	US 340	Extension of turn lanes	Flowing Springs Rd.	Jefferson Terrace Rd.	$5.8M
J102.2	US 340 - Ph.2	Widen to four Lanes	Washington St.	Virginia State Line	$240.4M
J104.1	US 340 / Country Club Rd. - Ph.1	Restriping / turn Lanes	US 340	Country Club Rd.	$.8M
J104.2	US 340 / Country Club Rd. - Ph.2	Grade Separate Interchange	US 340	Country Club Rd.	$36.3M
J105.0	WV 9 / Fairfax Blvd.	Intersection Improvements	WV 9	Fairfax Blvd.	$.3M
J106.0	WV 51	Intersection Improvements	CR 26	W. Washington St.	$11.0M
J107.0	WV 115	Access management improvements	US 340	Mission Rd.	$.9M
J201.0	New East-West Roadway	New two-lane roadway	Old Country Club Road	Shepherdstown Pk.	$5.9M
J202.0	New Frontage Roadway	US 340 frontage road	Jefferson Terrace Rd.	Halltown Rd.	$11.6M
J203.0	New Frontage Roadway	US 340 frontage road	Shipley School Rd.	Bakerton Rd.	$3.8M
J204.0	New Frontage Roadway	US 340 frontage road	Bakerton Rd.	W. Washington St.	$4.2M
J205.0	New North-South Roadway	New two-lane roadway	Alstadts Hill Rd.	Bakerton Rd.	$4.7M
J206.0	New North-South Roadway	New two-lane roadway	Keyes Ferry Rd.	Somerset Blvd.	$2.1M
J207.0	Flowing Springs Rd. / WV 230	Intersection Improvements	Flowing Springs Rd.	WV 230	$2.9M
J208.0	Flowing Springs Rd. / Country Club Rd.	Intersection Improvements	Flowing Springs Rd.	Country Club Rd.	$2.0M
J301.0	5th Ave. / Route 9 / Flowing Springs Rd.	Intersection Improvements (2)	5th Ave.	Flowing Springs Rd.	$3.0M
J302.0	16th Street Extension	New two-lane roadway	16th St.	5th Ave. Roundabout	$17.9M
J303.0	Beltline Ave.	New two-lane roadway	Extend west	Currie Ln.	$26.9M
J304.0	Beltline Ave.	Streetscape improvements	Currie Rd. Extended	Race Track Rd.	$7.5M
J305.0	CR 34 / Washington St.	Intersection improvements	CR 34	Washington St.	$1.2M

Table 9-6: Jefferson County Unconstrained (Vision) Projects

Proj. ID	Facility	Description	From	To	Cost (2017)
J306.0	Currie Rd.	New two-lane roadway	Old Leetown Pk.	WV 51	$22.4M
J307.0	Currie Rd. / Old Leetown Pike	Safety improvements	Currie Rd.	Old Leetown Pk.	$5.8M
J308.0	Huyett Rd. / Augustine Ave.	Intersection improvements	Huyett Rd.	Augustine Ave.	$.4M
J309.0	Mildred St.	Complete Street Corridor	Rail line	Beltline Rd.	$3.4M
J310.0	Mildred St. / Old Leetown Pk. / 16th Ave.	Roundabout Construction	Mildred St.	Old Leetown Pk.	$3.3M
J311.0	New Roadway	Improved road connections	Shenandoah Springs	Old Country Club Rd.	0.0M
J312.0	Washington St.	Traffic and Ped. Mobility Improvements	West St.	MLK Jr. Blvd.	$.9M
J401.0	Jefferson Ter. Ext.	New north-south roadway	Deep Creek Rd.	Jefferson Ter.	$3.9M
J402.0	New Frontage Road	US 340 frontage road	Alstadts Hill Rd.	Old Taylor Ln.	$.4M
J403.0	New Frontage Road	US 340 frontage road	Rion Hall Farm Entrance	Blair Rd.	$1.4M
J404.0	New Roadway	New two-lane roadway	US 340	Keyes Ferry Rd.	$1.9M
J405.2	Rockwool Blvd. - Ph.2	New two-lane roadway	Rockwell Blvd.	WV 480	$4.7M

Table 9-7: Washington County Unconstrained (Vision) Projects

Proj. ID	Facility	Description	From	To	Cost (2017)
W101.2	I-81 - Phase 2	Widen to six lanes	Exit 1	I-70	$83.5M
W101.3	I-81 - Phase 3	Widen to six lanes	I-70	US 40	$83.5M
W101.4	I-81 - Ph.4	Widen to six lanes	US 40	Pennsylvania	$129.7M
W102.0	I-70	Widen to six lanes	Frederick County	US 40	$144.4M
W103.0	I-70	Widen to six lanes	US 40	I-81	$291.7M
W104.0	I-70	Widen to six lanes	I-81	I-68	$2,639.4M
W105.0	MD 60	Widen to four lanes	Marsh Pike	Longmeadow Rd.	$44.6M
W106.0	MD 63	Widen to four lane (divided)	I-70	North of US 40	$58.6M
W107.0	MD 64	Multi-lane reconstruction	Eastern Blvd	Little Antietam Rd.	$155.0M
W108.0	MD 65	Widen to four lanes	I-70 Interchange	Wilson Blvd.	$19.6M
W109.0	MD 65	Widen to five lanes	I-70	Poffenberger Rd.	$170.2M
W110.0	MD 65	Widen to four lanes (divided)	Poffenberger Rd.	MD 68	$126.3M
W111.0	MD 65	Intersection improvements	MD 68	Shepherdstown Pike	$6.0M
W112.0	MD 65 / I-70	Interchange reconstruction	I-70	MD 65	$91.5M
W113.0	MD 66	Two-lane reconstruction	US 40 Alt.	0.6 mi south of I-70	$101.1M
W114.0	MD 66	Widen to four lanes	I-70	MD 64	$77.6M
W115.0	MD 68	Two-lane reconstruction	Pinesburg	US 11	$60.0M
W116.0	US 11	Widen to four lanes	Burhans Blvd.	Terminal Dr.	$144.8M
W117.0	US 11	Widen to four lanes	Hagerstown	Williamsport	$152.1M
W118.0	US 340 - Potomac River Bridge	Widen to four lanes	Virginia	Existing Divided Highway	$34.9M
W119.0	US 40	Widen to four lane (divided)	MD 63	MD 144	$50.0M
W120.0	US 40	Widen to six lanes (divided)	I-70	Eastern Blvd.	$17.3M
W121.0	US 522	Widen to four lane (divided)	West Virginia	I-70	$92.7M
W122.0	US Alt. 40	Two-lane reconstruction	W. of MD 67	Frederick County	$56.9M
W123.0	US Alt. 40	Two-lane reconstruction	Funkstown	MD 67	$43.0M

Table 9-7: Washington County Unconstrained (Vision) Projects (continued)

Proj. ID	Facility	Description	From	To	Cost (2017)
W201.0	Bucky Ave.	New two-lane roadway	Bucky Ave.	MD 144	$.4M
W202.2	Colonel Henry K. Douglas Dr. Extended - Phase 2	Bridge	Bridge over Antietam	-	$2.8M
W202.3	Colonel Henry K. Douglas Dr. Extended - Phase 3	New two-lane roadway	Bridge over Antietam	Phase 1	$2.4M
W202.4	Colonel Henry K. Douglas Dr. Extended - Phase 4	New two-lane roadway	Alt 40	Bridge over Antietam	$2.7M
W203.2	Crayton Blvd. - Phase 2	New connector road	Maugans Ave.	Showalter Rd.	$2.0M
W204.0	E. Oak Ridge Dr. / South Pointe Dr.	Construction of a traffic signal	E. Oak Ridge Dr.	South Pointe Dr.	$.3M
W205.0	Eastern Blvd. / Antietam Dr.	Intersection improvement	Eastern Blvd.	Antietam Dr.	$2.5M
W206.3	Eastern Blvd. Extended - Phase 3	Two lane highway w/ center turn lane and signal	Antietam Dr.	MD 60	$14.0M
W207.0	Halfway Blvd. Phases 2 & 3	750' extension and bridge	Bridge over Antietam	Halfway Blvd.	$4.0M
W208.1	Longmeadow Rd. - Ph.1	Widen to five lanes	Halifax Dr.	Marsh Pike	$9.8M
W208.2	Longmeadow Rd. - Ph.2	Widen to five lanes	Marsh Pike	MD 60	$9.8M
W209.0	Marsh Pike	Widen to four lanes	MD 60	Longmeadow Rd.	$1.8M
W210.0	Maugans Ave.	Widen to three lanes	I-81	Main St.	$7.9M
W211.0	Maugans Ave.	New two-lane roadway	Main St.	Garden View Rd.	$10.7M
W212.0	N. Main St.	Widen road	Geiser Way	Existing Parking	$1.2M
W213.0	Newgate Blvd.	New two-lane roadway	Halfway Blvd.	US 40	$2.0M
W214.1	Professional Blvd. Bridge - Phase 1	Bridge and four lane road construction	Professional Ct.	Bridge over Antietam	$8.6M
W214.2	Professional Blvd. Extended - Phase 2	New four-lane roadway	Bridge over Antietam	Yale Dr.	$5.5M
W214.3	Professional Blvd. Extended - Phase 3	New four-lane roadway	Yale Dr.	Professional Blvd Ph. 2	$1.7M
W214.4	Professional Blvd. Extended - Phase 4	New four-lane roadway	Professional Blvd. Ph 3	O'Neals Place	$1.8M

Table 9-7: Washington County Unconstrained (Vision) Projects (continued)

Proj. ID	Facility	Description	From	To	Cost (2017)
W215.0	Showalter Rd. East	New road construction	US 11	Paradise Church Rd.	$15.3M
W216.0	Underpass Way / Halfway Blvd.	Roundabout construction	Underpass Way	Halfway Blvd.	$1.0M
W217.0	Burnside Bridge Rd.	Spot Improvements	Burnside Bridge Rd.	Mills Rd.	$.5M
W218.0	Western Maryland Parkway Extended	New road construction	Railway Lane	Western MD Parkway	$8.4M
W301.0	Edgewood Dr.	Widen to four lanes	Haywood Circle	US 40	$9.6M
W302.0	Haven Rd.	Reconstruction	Pennsylvania Ave.	End	$6.4M
W303.0	MD 60	Multi-lane reconstruction	Northern Ave.	Marsh Pike	$40.1M
W304.1	Monroe Blvd. / Warrior Blvd. Extension (North)	New two-lane roadway	MD 68	MD 34	$6.1M
W304.2	Monroe Blvd. / Warrior Blvd. Extension (South)	New two-lane roadway	MD 34	MD 67	$5.9M
W305.0	Northwest Connector	New minor collector road	Haven Rd.	Salem Ave.	$5.2M
W306.0	Paul Smith Blvd.	New two-lane collector	US Alt. 40	US 40	$7.5M
W307.2	Southern Blvd. - Ph.2	New four-lane collector	Edgewood Drive	Frederick St.	$13.2M
W308.0	Wesel Blvd.	Widen to four lanes	Burhans Blvd.	Current 4-Lane Segment	$5.1M

The Berkeley County and Jefferson County projects are expected to cost $1.2 billion, while the Washington County projects are expected to cost $5.1 billion. These project costs greatly exceed the anticipated funding under this long-range plan. West Virginia funding is only expected to cover 17% of the project costs, while the Maryland funding is only expected to cover 4% of project costs (**Figure 9-1**). In light of this funding shortage, a prioritization process was used to identify the most beneficial (and cost-effective) projects for the region. This process is discussed in the following section.

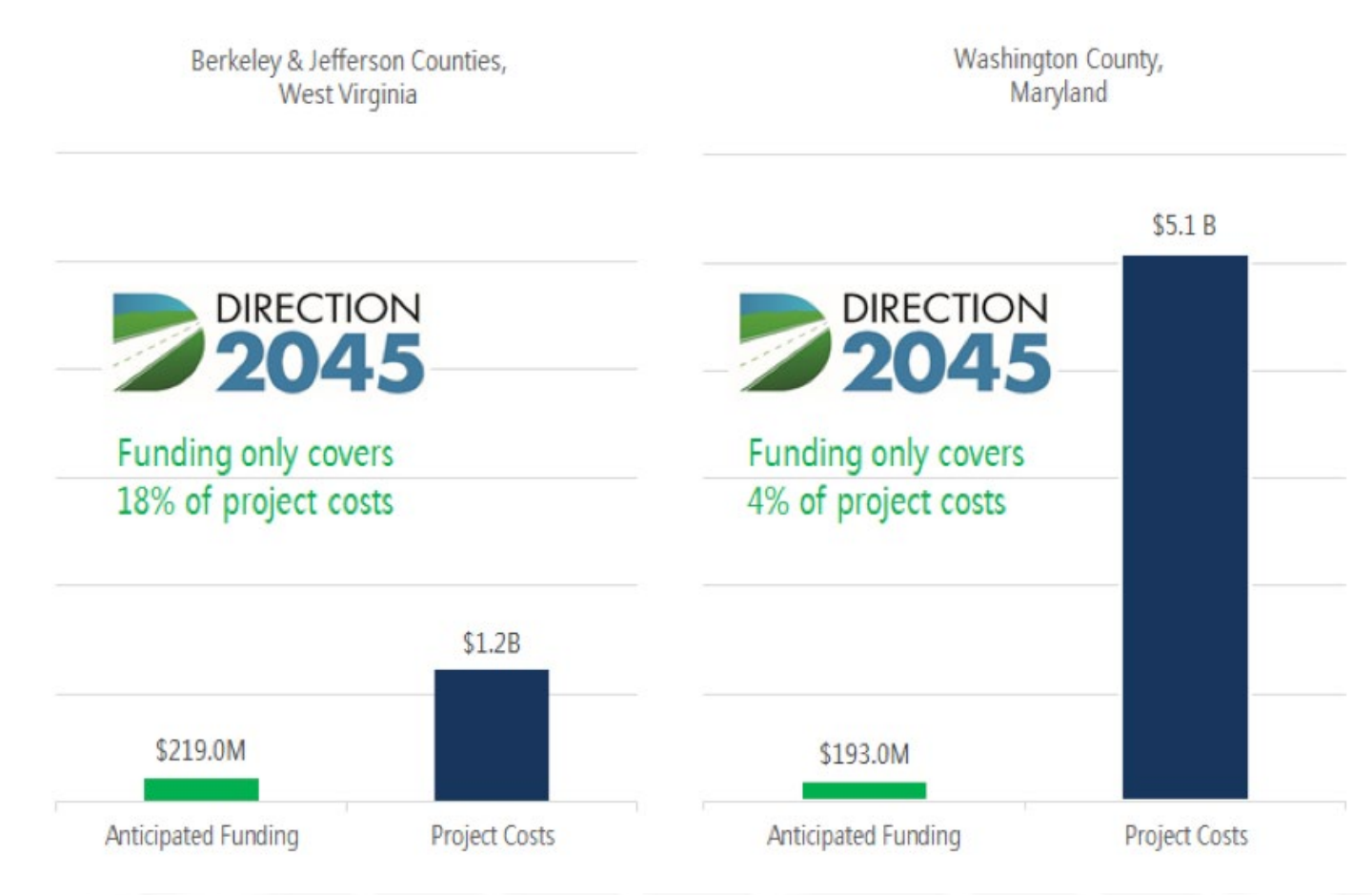


Figure 9-1: Comparing Anticipated Funding to Project Costs (2017 dollars)

PROJECT PRIORITIZATION

Direction 2045 utilizes a multi-dimensional prioritization process for scoring and evaluating potential transportation improvement projects within the region. This evaluation process, summarized below (**Figure 9-2**), relied on jurisdiction and stakeholder input to identify local priorities. These local priorities, many of which are reflected in jurisdiction plans, provided a foundation for prioritizing and identifying projects for the Fiscally Constrained Plan (discussed later). In addition, the prioritization process measured (and scored) projects based on various criteria. This scoring process is discussed below.

Figure 9-2: The Project Evaluation Process

The prioritization process utilizes a data-driven approach and considers quantitative, qualitative, and geographic characteristics (or criteria). The quantitative measures use data from each project to measure performance, such as existing congestion and traffic volume. The qualitative measures reflect public input including that received from the web-based survey. The geographic characteristics help evaluate a project's location in the context of multi-modal infrastructure, environmental features, and anticipated growth trends.

Projects received individual scores for each unique measure (or criteria), with several criteria providing additional weight or influence. The project scores were then aggregated to calculate total scores for each project where a higher total score indicates a higher prioritization ranking. From there, the project scores were divided by the project costs, which yields a "benefit-cost" score. The prioritization categories, criteria, and weights are shown in **Table 9-8**.

Table 9-8: Project Prioritization Categories, Criteria, and Weights

Category	Criteria	Weight (multiplier)
Safety Enhancements	Addresses high-crash location	2
Existing Congestion	Existing congestion based on TomTom data	2
Traffic Volume	Traffic volumes (reflecting the number of vehicles impacted)	1
Transit Service Improvement	Improve transit travel times and/or provides supporting infrastructure	1
Bicycle/Pedestrian	Project includes bicycle/pedestrian accommodations OR aligns with a project from Regional Bike Plan	1
Freight Mobility	Project aligns with a Critical Freight Corridor	2
Growth Management	In vicinity of employment and housing growth (using trip growth surrogate)	2
Resiliency*	Environmental Features (wetlands, Floodplains, Historic, Parks)	1
Pubic Input	Map comments	1
Travel and Tourism*	Improve mobility and accessibility to travel and tourism sites, venues	1

**Reflects a new FHWA planning factor*

THE FISCALLY CONSTRAINED PLAN

Fiscal constraint has been a prominent Federal requirement of transportation planning and program development since 1991. Fiscal constraint requires that a MPO demonstrate that they have, or can reasonably expect to receive sufficient funds to implement projects identified in the long-range transportation plan. Due to the gap between future needs and anticipated funding, not all unconstrained (or "vision") projects can be included in the Fiscally Constrained Plan.

As discussed above, projects were assigned to the Fiscally Constrained Plan for West Virginia and Maryland based on local input and projects Benefit-Cost (BC) scores. The Fiscally Constrained Plan includes different funding streams for West Virginia and Maryland, meaning that Washington County projects did not compete with Berkeley and Jefferson county projects (and vice versa).

The tables and maps below highlight the fiscally constrained projects for Berkeley, Jefferson, and Washington counties. Costs are shown in 2017 dollars and in year-of-expenditure (YOE) dollars to ensure that future project costs do not exceed anticipated future revenue (funding). The projects can also be viewed in this interactive web-map.

Table 9-9: Berkeley County Fiscally Constrained Projects

Phase	Project ID	Facility	Recommendation	2017 Cost	YOE Cost	Local Priority	Initial Prioritiz. Score	Benefit Cost Score
PHASE 1: Post TIP Short Term (2023-2030)	B308.0	Raleigh St. / Race St.	Intersection Improvements	$.4M	$.6M	HIGH	7.8	19.2
	B304.0	King St.	Intersection improvements	$4.6M	$6.9M	HIGH	9.1	2.0
	B106.0	WV 9	Widen to six lanes	$9.9M	$14.8M	HIGH	9.2	0.9
	B107.0	WV 45	Widen to six lanes	$8.4M	$12.5M	HIGH	12.1	1.4
	B204.0	WV 115 / Charles Town Rd. / Baker Heights Rd.	Intersection Improvements	$.7M	$1.0M	LOW	5.1	7.8
	B307.0	North-South Connector	Construct new roadway	$2.0M	$3.0M	MEDIUM	2.4	1.2
	B108.0	WV 45	Intersection Improvements	$13.6M	$20.3M	LOW	9.3	0.7
PHASE 2: Post TIP Long Term (2031-2040)	B103.0	US 11	Intersection improvements	$17.4M	$42.3M	HIGH	12.1	0.7
	B102.0	US 11	Intersection improvements	$29.4M	$71.4M	HIGH	9.4	0.3
	B101.2	I-81 - Phase 2	Widen to six lanes	$72.0M	$174.7M	HIGH	7.6	0.1
	B202.0	Giles Mill Rd. Bridge	Widen to 2 Lanes	$1.3M	$3.2M	LOW	3.2	2.5
	B301.0	Commercial Road Connector	Construct new roadway	$2.0M	$4.9M	MEDIUM	1.6	0.8
Fiscal Constraint	Total Project Cost (YOE $)				$427.7M			
	Total Anticipated Revenue or Funding YOE $)				$429.8M			
	Remaining Funds (YOE $), Demonstrating Fiscal Constraint				$2.1M			

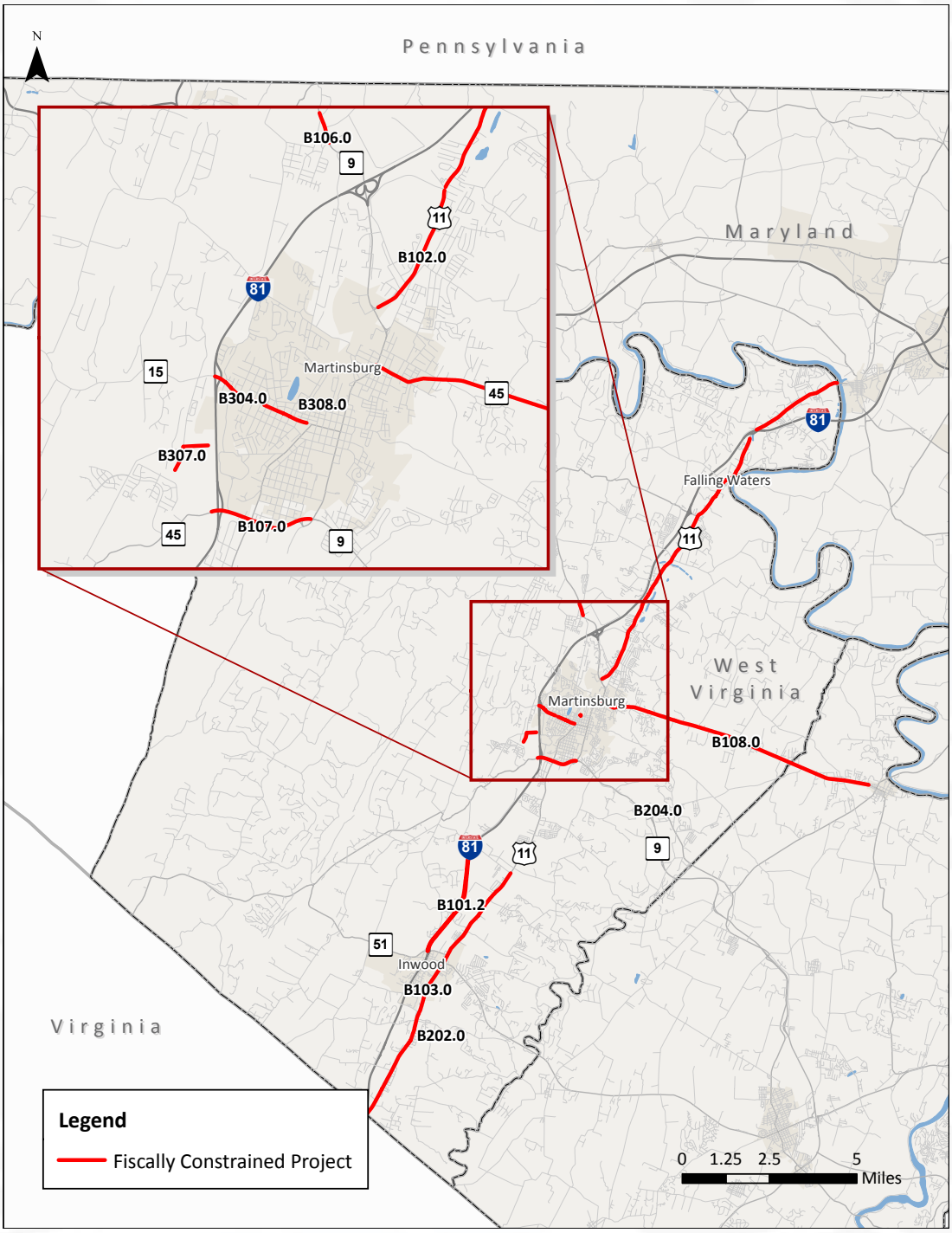


Figure 9-3: Berkeley County Fiscally Constrained Projects

Table 9-10: Jefferson County Fiscally Constrained Projects

Phase	Project ID	Facility	Recommendation	2017 Cost	YOE Cost	Local Priority	Initial Prioritiz. Score	Benefit Cost Score
PHASE 1: Post TIP Short Term (2023-2030)	J105.0	WV 9 / Fairfax Blvd.	Intersection Improvements	$.3M	$.4M	HIGH	9.2	34.2
	J308.0	Huyett Rd. / Augustine Ave.	Intersection improvements	$.4M	$.6M	HIGH	5.1	12.7
	J104.1	US 340 / Country Club Rd. - Phase 1	Restriping / Turn Lanes	$.8M	$1.2M	HIGH	8.1	10.0
	J305.0	CR 34 / Washington St.	Intersection improvements	$1.2M	$1.8M	HIGH	6.7	5.6
	J312.0	Washington St.	Traffic Safety and Pedestrian Mobility Improvements	$.9M	$1.4M	HIGH	5.1	5.4
	J107.0	WV 115	Access management improvements	$.9M	$1.4M	HIGH	4.4	4.7
	J301.0	5th Ave. / Route 9 / Flowing Springs Rd.	Intersection Improvements	$3.0M	$4.4M	HIGH	7.6	2.6
	J310.0	Mildred St. / Old Leetown Pk. / 16th Ave.	Travel lane alignment and turn lane improvements	$3.3M	$5.0M	HIGH	8.4	2.5
	J309.0	Mildred St.	Complete Street Corridor	$3.4M	$5.0M	HIGH	7.2	2.1
	J101.0	US 340	Extension of turn lanes	$5.8M	$8.7M	HIGH	11.7	2.0
	J402.0	New Frontage Road	US 340 frontage road	$.4M	$.7M	LOW	2.5	5.7
	J208.0	Flowing Springs Rd. / Country Club Rd.	Intersection Improvements	$2.0M	$3.0M	LOW	5.7	2.9
	J404.0	New Roadway	New two lane roadway	$1.9M	$2.8M	LOW	2.3	1.2
	J405.2	Rockwool Blvd. - Phase 2	New two lane roadway	$4.7M	$7.0M	MEDIUM	2.5	0.5

Table 9-10: Jefferson County Fiscally Constrained Projects (continued)

Phase	Project ID	Facility	Recommendation	2017 Cost	YOE Cost	Local Priority	Initial Prioritiz. Score	Benefit Cost Score
PHASE 2: Post TIP Long Term (2031-2040)	J304.0	Beltline Ave.	Streetscape	$7.5M	$18.3M	HIGH	1.6	0.2
	J311.0	New Roadway	Improved road connections	0.0M	0.0M	LOW	4	-
	J207.0	Flowing Springs Rd. / WV 230	Intersection Improvements	$2.9M	$7.0M	MEDIUM	5.5	1.9
	J403.0	New Frontage Road	US 340 frontage road	$1.4M	$3.5M	LOW	2.4	1.7
Fiscal Constraint	Total Project Cost (YOE $)				$429.7M			
	Total Anticipated Revenue or Funding YOE $)				$429.8M			
	Remaining Funds (YOE $), Demonstrating Fiscal Constraint				$.1M			

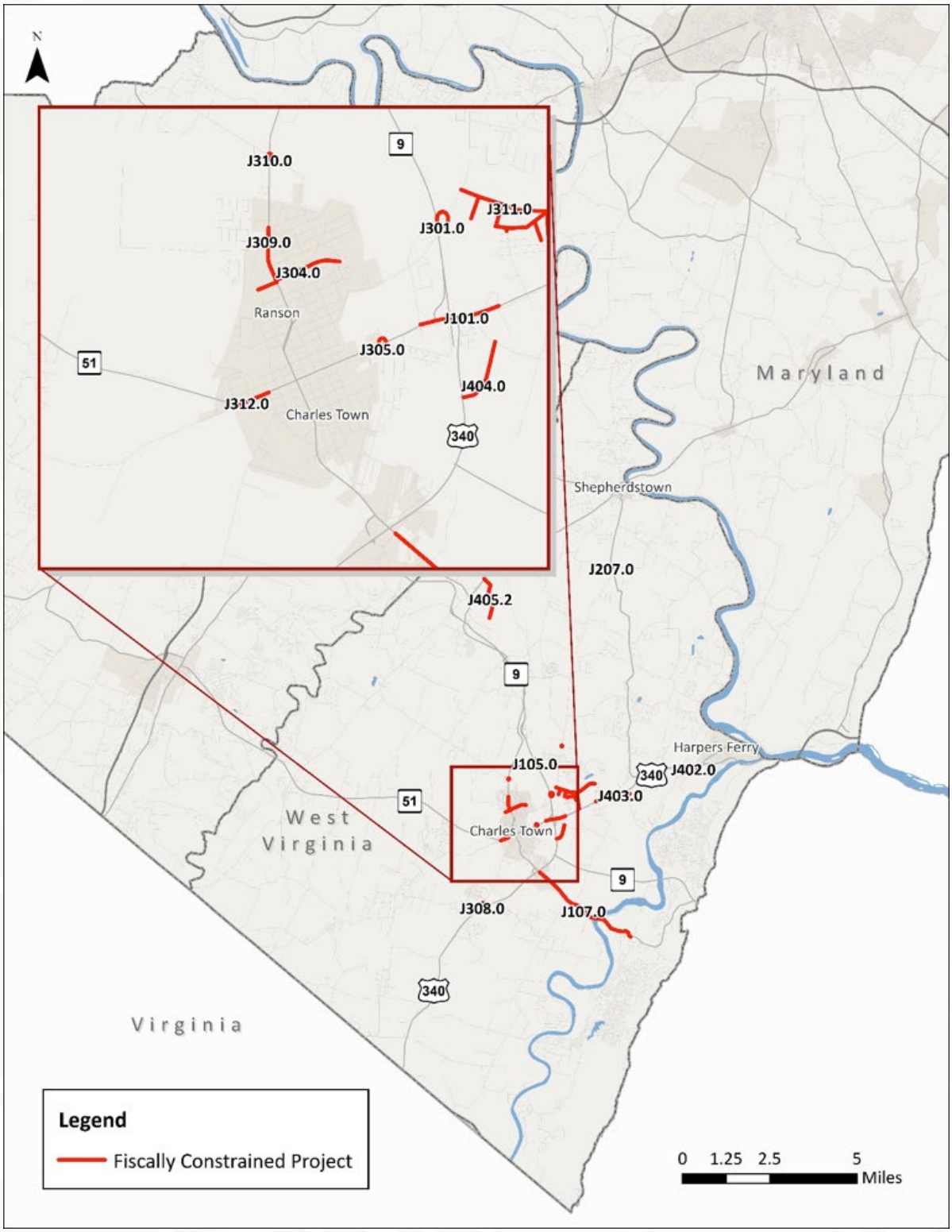


Figure 9-4: Jefferson County Fiscally Constrained Projects

Table 9-11: Washington County Fiscally Constrained Projects

Phase	Project ID	Facility	Recommendation	2017 Cost	YOE Cost	Local Priority	Initial Prioritiz. Score	Benefit Cost Score
PHASE 1: Post TIP Short Term (2023-2030)	W204.0	E. Oak Ridge Dr. / South Pointe Dr.	Construction of a traffic signal	$.3M	$.4M	HIGH	4.0	12.0
	W216.0	Underpass Way / Halfway Blvd.	Roundabout construction	$1.0M	$1.2M	HIGH	4.9	4.9
	W209.0	Marsh Pike	Widen to four lanes	$1.8M	$2.2M	HIGH	5.9	3.2
	W205.0	Eastern Blvd./ Antietam Dr.	Intersection improvement	$2.5M	$3.0M	HIGH	6.5	2.6
	W214.4	Professional Blvd. Extended - Phase 4	New four lane road	$1.8M	$2.2M	HIGH	3.8	2.1
	W214.3	Professional Blvd. Extended - Phase 3	New four lane road	$1.7M	$2.0M	HIGH	2.9	1.7
	W203.2	Crayton Blvd. - Phase 2	New connector road	$2.0M	$2.4M	HIGH	2.9	1.5
	W202.3	Colonel Henry K. Douglas Dr. Extended - Phase 3	New two lane road	$2.4M	$3.0M	HIGH	2.6	1.1
	W202.2	Colonel Henry K. Douglas Dr. Extended - Phase 2	Bridge	$2.8M	$3.4M	HIGH	2.6	0.9
	W207.0	Halfway Blvd. Phases 2 & 3	750' extension and bridge	$4.0M	$4.8M	HIGH	3.7	0.9
	W304.1	Monroe Blvd. / Warrior Blvd. Extension Road Extension (North)	New two lane road	$6.1M	$7.4M	HIGH	5.3	0.9

Table 9-11: Washington County Fiscally Constrained Projects (continued)

Phase	Project ID	Facility	Recommendation	2017 Cost	YOE Cost	Local Priority	Initial Prioritiz. Score	Benefit Cost Score
PHASE 1: Post TIP Short Term (2023-2030)	W214.2	Professional Blvd. Extended - Phase 2	New four lane road	$5.5M	$6.6M	HIGH	4.3	0.8
	W214.1	Profesional Blvd. Bridge - Phase 1	Bridge and four lane road construction	$8.6M	$10.4M	HIGH	3.8	0.4
	W112.0	MD 65 / I-70	Interchange Reconstruction	$91.5M	$110.4M	HIGH	6.9	0.1
PHASE 2: Post TIP Long Term (2031-2045)	W206.3	Eastern Blvd. Extended - Phase 3	Two lane highway w/ center turn lane and signal	$14.0M	$21.1M	HIGH	5.3	0.4
	W101.3	I-81 - Phase 3	Widen to six lanes	$83.5M	$126.6M	HIGH	7.9	0.1
	W101.2	I-81 - Phase 2	Widen to six lanes	$83.5M	$126.6M	HIGH	7.5	0.1
	W217.0	Burnside Bridge Rd.	Spot Improvements	$.5M	$.8M	MEDIUM	2.9	5.3
	W212.0	N. Main St.	Widen road	$1.2M	$1.8M	LOW	5.7	4.7
	W201.0	Bucky Ave.	New two lane road	$.4M	$.5M	MEDIUM	1.2	3.4
	W213.0	Newgate Blvd.	New two lane road	$2.0M	$3.0M	MEDIUM	4.4	2.2
	W308.0	Wesel Blvd.	Widen to four lanes	$5.1M	$7.7M	LOW	7.7	1.5
	W202.4	Colonel Henry K. Douglas Dr. Extended - Phase 4	New two lane road	$2.7M	$4.1M	MEDIUM	2.6	1.0
	W305.0	Northwest Connector	New minor collector road	$5.2M	$7.9M	LOW	4	0.8
	W306.0	Paul Smith Blvd.	New two lane collector	$7.5M	$11.3M	LOW	2.8	0.4
	W215.0	Showalter Rd.	New road construction	$15.3M	$23.1M	MEDIUM	3.1	0.2
Fiscal Constraint	Total Project Cost (YOE $)				$494.2M			
	Total Anticipated Revenue or Funding YOE $)				$503.4M			
	Remaining Funds (YOE $), Demonstrating Fiscal Constraint				$9.2M			

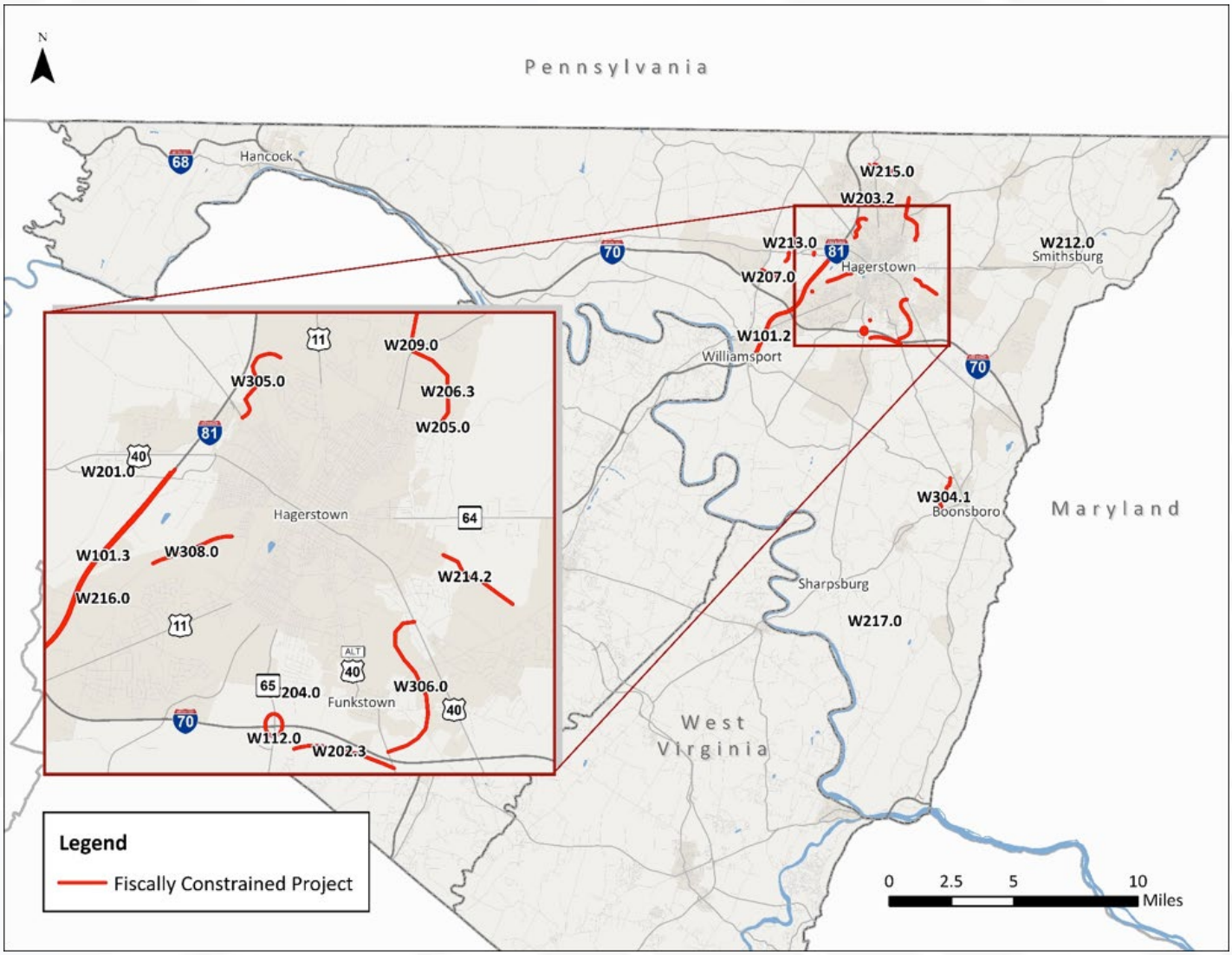


Figure 9-5: Washington County Fiscally Constrained Projects

TEN CHAPTER ENVIRONMENT

This section highlights key natural and environmental resources in the HEPMPO region that can have an impact on the planning, design and operation of the transportation system. It also highlights ongoing efforts to address the new FAST Act requirement for the inclusion of resiliency as a planning factor in the Metropolitan Transportation Planning process.

Early identification of significant environmental features within proposed project corridors can support early screening of alternatives prior to the project reaching a more advanced point in the Preliminary Design and National Environmental Policy Act (NEPA) process where detailed analysis and changes can become more time consuming and costly. Although Direction 2045 highlights some of the key environmental issues in relation to the fiscally-constrained project list, additional Planning and Environmental Linkage (PEL) studies may be required to provide more detailed assessments. A PEL study can be used to identify and prioritize future projects, develop the purpose and need for a project, determine project size or length, and/or develop and refine a range of alternatives. The HEPMPO has worked with each state DOT to conduct PEL studies in the region and will continue to emphasize such efforts in the future to further address impacts on our region's natural resources.

ENVIRONMENTAL RESOURCES

PARKS

Publicly-owned parks are a protected resource under Section 4(f) of the U.S. DOT Act of 1966. There are many parks and recreation areas in the HEPMPO region including national, state, and county parks; neighborhood parks; recreational waterways; and historic battlefields. The HEPMPO region contains three prominent national parks: Harpers Ferry, the Chesapeake and Ohio Canal, and the Antietam National Battlefield.

Washington County contains over 33,000 acres of public lands protected for open space or recreational use (*Washington County Land Preservation, Parks, and Recreation Plan*). These public lands include county and municipal parks with facilities for active recreation, such as ball fields and tennis courts, as well as watersheds, forest land and wildlife areas for camping, hiking and hunting. The combined federal, state and local recreation and park acreage comprises over 11.0% of the County's total land area. Berkeley County contains a multitude of park facilities ranging from one-acre parks to the 137-acre Poor House Farm Park, as well as the 23,000-acre Sleepy Creek Wildlife Management Area, which is described in the *Berkeley County Comprehensive Plan* as a passive recreation area. In Jefferson County, the Jefferson County Parks and Recreation Commission (JCPRC) maintains eight park facilities comprising over 250 acres, not including recreational open space.

WATER FEATURES

Water features are vital environmental resources that sustain life in a number of ways. Water features such as lakes, rivers, streams and wetlands provide habitat for fish, plants, and a wide variety of other wildlife. The protection and preservation of water features ensures clean drinking water and irrigation for crops. Additionally, water features such as wetlands serve as natural flood management systems and can help prevent and mitigate natural disasters. Water and water features are protected by numerous laws, including the National Environmental Policy Act (NEPA).

Berkeley, Jefferson, and Washington counties maintain an aesthetically pleasing natural landscape with many water features. In particular, all three Counties lie entirely within the Potomac River Drainage Basin, which ultimately flows into the Chesapeake Bay. Because of the importance of the Chesapeake Bay to the regional economy and as a major source of environmental conservation efforts, this area must operate under stringent state and federal regulations. There are nine major tributaries of the Potomac River in Washington County: Sideling Hill Creek, Tonoloway Creek, Little Tonoloway Creek, Licking Creek, Conococheague Creek, Little Conococheague Creek, Marsh Run, Antietam Creek and Israel Creek.

The Potomac River is the primary drinking source for the county and also accommodates a multitude of commercial and recreational uses. Both Jefferson and Berkeley Counties utilize the resources of the Potomac River in addition to two other major waterways; the Shenandoah River and Opequon Creek. All of the streams and tributaries within Jefferson and Berkeley Counties, regardless of origin, eventually flow into the Potomac River and therefore the Chesapeake Bay. **Figure 10-1** identifies the water resources of the HEPMPO region

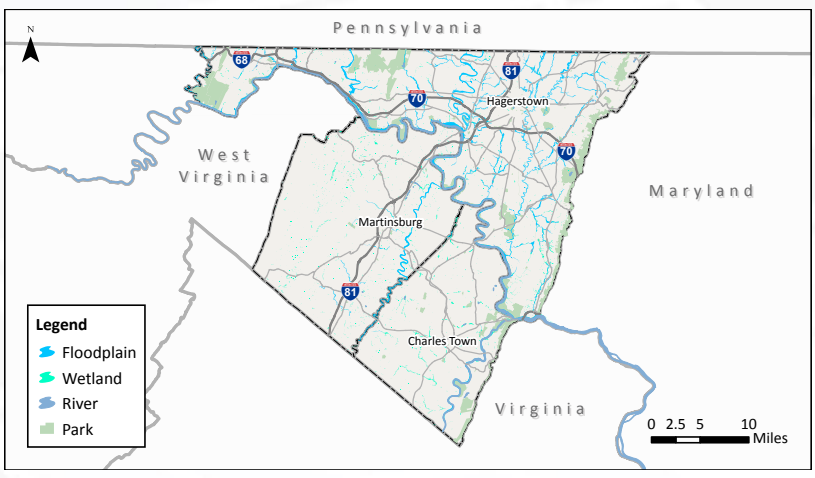


Figure 10-1 HEPMPO Region Water Resources

SYSTEM RESILIENCY

The HEPMPO has initiated efforts aimed to better anticipate the consequences and potential impacts of extreme weather events and to identify funding priorities and strategies to improve transportation system resiliency. Extreme weather events present significant and growing risks to the safety, reliability, effectiveness, and sustainability of transportation infrastructure and operations across the United States. Key components of the national transportation system have become increasingly vulnerable to climate impacts including facilities such as port, airports and rail terminals; and, fixed route infrastructure such as roads, bridges, trails, locks, canals, railways (freight and commuter), subways, and pipelines.

Weather events influence the daily and seasonal operation of transportation systems. Many inland states including Maryland and West Virginia have experienced severe precipitation events that have recently damaged roads, bridges, and rail systems. While transportation infrastructure is designed to handle a broad range of impacts based on historic climate, preparing for climate change and extreme weather events is critical to protecting the integrity of the transportation system and financial investments.

The impacts of extreme weather events and a changing climate (such as higher temperatures, sea-level rise, and changes in seasonal precipitation and rain intensity) are affecting the lifecycle of transportation systems and are projected to intensify based on recent climate studies. Inland flooding from unusually heavy downpours can disrupt traffic, damage culverts, and reduce service life. High heat can degrade materials, resulting in shorter replacement cycles and higher maintenance costs.

National studies have identified likely impacts of climate change on the highway system. **Table 10-1** summarizes such impacts by climate variable as documented in *NCHRP Report 750: Climate Change, Extreme Weather Events, and the Highway System*. Understanding historic weather and potential climate impacts on the HEPMPO region's transportation system is an important first step in identifying viable adaptation strategies and prioritizing available funds for infrastructure improvements. Climate adaptation includes actions by individuals or systems to avoid, withstand, or take advantage of current and projected climate changes and impacts. Adaptation decreases a system's vulnerability, reduces risk and/or increases its resilience to impacts.

Table 10-1: Impacts of Climate Change on Highway System

Climate Characteristic	Climatic/Weather Change	Impact to Infrastructure	Impact to Operations/ Maintenance
Precipitation	Change in range of maximum and minimum temperatures	Fewer days with snow and ice on roadways;	decrease in frozen precipitation would improve mobility and safety of travel through reduced winter hazards, reduce snow and ice removal costs, decrease need for winter road maintenance, result in less pollution from road salt, and decrease corrosion of infrastructure and vehicles;
		Reduced frost heave and road damage;	longer road construction season in colder locations
		Structures will freeze later and thaw earlier with shorter freeze season lengths	vehicle load restrictions in place on roads to minimize structural damage due to subsidence and the loss of bearing capacity during spring thaw period (restrictions likely to expand in areas with shorter winters but longer thaw seasons)
		Increased freeze-thaw conditions creating frost heaves and potholes on road and bridge surfaces;	Roadways built on permafrost likely to be damaged due to lateral spreading and settlement of road embankments
		Permafrost thawing leads to increased slope instability, landslides and shoreline erosion damaging roads and bridges due to foundation settlement (bridges and large culverts are particularly sensitive to movement caused by thawing permafrost);	Shorter season for ice roads.
		Hotter summers in Alaska lead to increased glacial melting and longer periods of high stream flows, causing both increased sediment in rivers and scouring of bridge supporting piers and abutments.	

Table 10-1: Impacts of Climate Change on Highway System (continued)

Climate Characteristic	Climatic/Weather Change	Impact to Infrastructure	Impact to Operations/ Maintenance
Precipitation	Greater changes in precipitation levels	If more precipitation falls as rain rather than snow in winter and spring, there will be an increased risk of landslides, slope failures, and floods from the runoff, causing road washouts and closures as well as the need for road repair and reconstruction;	Regions with more precipitation could see increased weather-related accidents, delays, and traffic disruptions (loss of life and property, increased safety risks, increased risks of hazardous cargo accidents)
		Increasing precipitation could lead to soil moisture levels becoming too high (structural integrity of roads, bridges, and tunnels could be compromised leading to accelerated deterioration);	Closure of roadways and underground tunnels due to flooding and mudslides in areas deforested by wildfires
		Less rain available to dilute surface salt may cause steel reinforcing in concrete structures to corrode;	Increased wildfires during droughts could threaten roads directly, or cause road closures due to fire threat or reduced visibility
		Road embankments at risk of subsidence/heave;	Clay subsurfaces for pavement could expand or contract in prolonged precipitation or drought causing pavement heave or cracking
		Drought-caused shrinkage of subsurface soils	
	Increased intense precipitation, other change in storm intensity (except hurricanes)	Heavy winter rain with accompanying mudslides can damage roads (washouts and undercutting) which could lead to permanent road closures;	The number of road closures due to flooding and washouts will likely rise;
		Heavy precipitation and increased runoff can cause damage to tunnels, culverts, roads in or near flood zones, and coastal highways;	Erosion at road construction project sites as heavy rain events take place more frequently;
		Bridges are more prone to extreme wind events and scouring from higher stream runoff;	Road construction activities could be disrupted;

Table 10-1: Impacts of Climate Change on Highway System (continued)

Climate Characteristic	Climatic/Weather Change	Impact to Infrastructure	Impact to Operations/ Maintenance
Precipitation	Increased intense precipitation, other change in storm intensity (except hurricanes)	Bridges, signs, overhead cables, tall structures at risk from increased wind speeds	Increase in weather-related highway accidents, delays, and traffic disruptions;
			Increase in landslides, closures or major disruptions of roads, emergency evacuations and travel delays;
			Increased wind speeds could result in loss of visibility from drifting snow, loss of vehicle stability/maneuverability, lane obstruction (debris), and treatment chemical dispersion;
			Lightning/electrical disturbance could disrupt transportation electronic infrastructure and signaling, pose risk to personnel, and delay maintenance activity
Sea Level Rise	Sea Level Rise	Higher sea levels and storm surges will erode coastal road base and undermine bridge supports	Coastal road flooding and damage resulting from sea-level rise and storm surge;
		Temporary and permanent flooding of roads and tunnels due to rising sea levels	Underground tunnels and other low-lying infrastructure will experience more frequent and severe flooding;
		Encroachment of saltwater leading to accelerated degradation of tunnels (reduced life expectancy, increased maintenance costs and potential for structural failure during extreme events)	
		Loss of coastal wetlands and barrier islands will lead to further coastal erosion due to the loss of natural protection from wave action	

Table 10-1: Impacts of Climate Change on Highway System (continued)

Climate Characteristic	Climatic/Weather Change	Impact to Infrastructure	Impact to Operations/ Maintenance
Hurricanes	Increased hurricane intensity	Stronger hurricanes with more precipitation, higher wind speeds, and higher storm surge and waves are projected to increase;	More frequent flooding of coastal roads;
		Increased infrastructure damage and failure (highway and bridge decks being displaced)	More transportation interruptions (storm debris on roads can damage infrastructure and interrupt travel and shipments of goods)
			More coastal evacuations

Source: Table I.1 from NCHRP Report 750: Climate Change, Extreme Weather Events and the Highway System (Transportation Research Board, 2014)

IMPETUS FOR ACTION

Adaptation planning is in its early stages, with much more research and work to be done. Through FHWA pilot studies, select state and regional transportation agencies have become engaged in adaptation planning and initiated efforts to identify vulnerabilities, ascertain risks, and identify specific strategies. Strategies have included infrastructure design standard changes, retrofit of vulnerable facilities, enhancement of drainage systems, and development of additional information for emergency evacuation planning. It is likely that the understanding of climate risks and risk-based adaptation planning will evolve significantly over time.

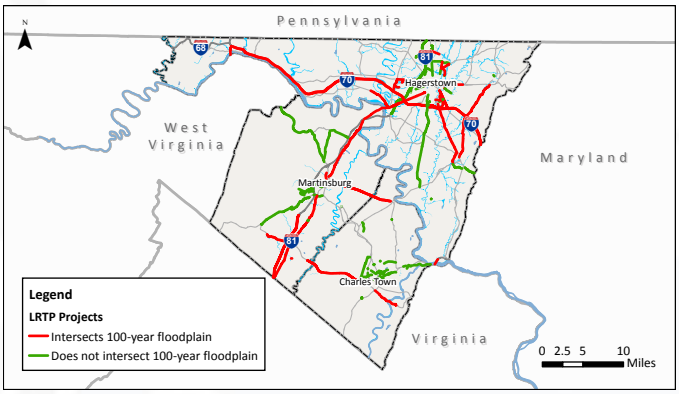


Figure 10-2 HEPMPO LRTP Projects that fall within the Existing FEMA Floodplains

The Fixing America's Surface Transportation (FAST) Act is the current transportation funding authorization bill passed by Congress in 2015. It includes the addition of system resiliency as a new planning factor in Section 1201 for Metropolitan Transportation Planning. The FAST Act will require Metropolitan Planning Organizations (MPOs) to address resiliency (e.g. typically through the identification and prioritization of vulnerabilities and strategies). The success of these resiliency efforts will require collaboration and coordination between regional and state agencies.

Figure 10-2 highlights the planned transportation projects that are located within existing FEMA floodplains. Many of these transportation facilities are already designed to address stormwater and flooding management. However, as these transportation projects are improved or reconstructed considerations should be made regarding the resiliency of the projects to more extreme weather events including high precipitation storms. HEPMPO will continue to coordinate and monitor the impacts of flooding with ongoing DOT efforts. For example, MDOT is currently conducting studies to identify potential climate change impacts on inland flooding within the state. They will also be developing tools and methods to better monitor the impacts of flooding on the transportation system.

CHAPTER ELEVEN
PREPARING FOR THE FUTURE

There have been significant changes in transportation technology and travel behavior since April 2014, the completion date for Direction2040, the region's previous Long Range Transportation Plan. Automakers and technology companies, like Ford, Volvo, Tesla, and Alphabet (Google), are testing Level-4 connected and automated vehicles (driverless cars and trucks), while autonomous, electric shuttles are providing public transportation in communities around the world. Meanwhile, mobility-on-demand services, like Uber and Lyft, are changing travel behavior and offering unprecedented convenience and mobility. This chapter identifies some of the game-changing technological trends, discusses potential opportunities for the HEPMPO region, and concludes with a section on recommended future studies.

EMERGING TECHNOLOGIES

MOBILITY-ON-DEMAND

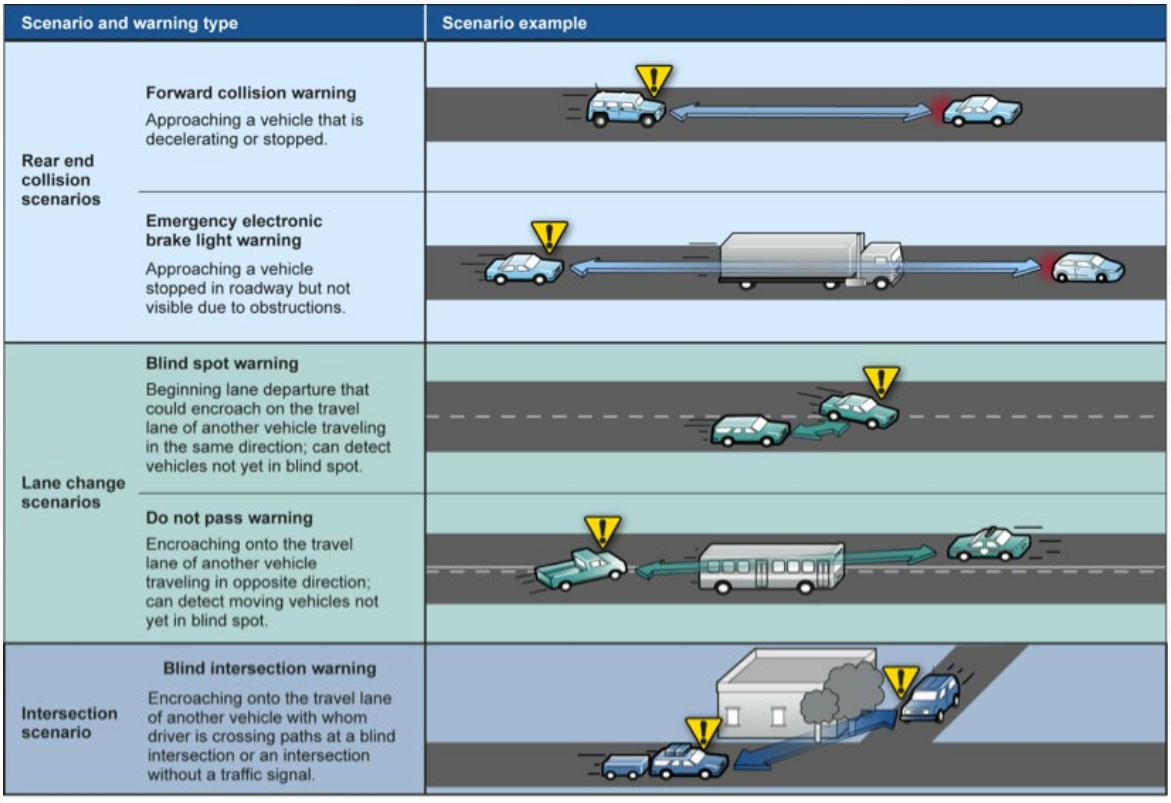
The growth of on-demand transportation options, like Uber and Lyft, are changing how we get around. Uber expanded service to Hagerstown, Maryland in Fall 2015 and to Charleston and Morgantown, West Virginia in Summer 2016. On-demand transportation can complement existing transit networks by providing a transportation alternative in places without transit service. It is possible that mobility-on-demand alternatives will become increasingly affordable in the future as connected and automated vehicles replace the need for human drivers, thus helping companies reduce costs. There is also speculation that affordable, autonomous, mobility-on-demand services could significantly reduce personal vehicle ownership rates, which, in turn could reduce the total number of vehicles on the road (but not necessarily reduce the miles traveled).

Significantly fewer people could own their own cars in the future, opting for mobility-on-demand services, instead.

CONNECTED AND AUTOMATED VEHICLES

The transportation community generally refers to Connected and Automated Vehicles (CAVs) to represent a broad category of vehicles with advanced information technology functions and systems. As the name implies, CAVs employ a range of connected vehicle (CV) and autonomous vehicle (AV) features, which are discussed below.

There have been rapid advances in Connected Vehicle (CV) technology in the past few years, allowing vehicles to communicate with each other (Vehicle to Vehicle or V2V), with the roadway infrastructure (Vehicle to Infrastructure or V2I) and with the surrounding environment (Vehicle to Everything or V2X). These connected technologies use short-range communications (and possibly "5G in the coming years) to share information about potentially dangerous situations that could lead to crashes. In doing so, they can complement the sensors and cameras on vehicles by "seeing" around corners or "through" other vehicles, helping to detect threats and prevent crashes. **Figure 11-1** helps visualize some examples of V2V capabilities and applications. In December 2016, the U.S. Department of Transportation's National Highway Traffic Safety Administration has issued a Notice of Proposed Rulemaking (NPRM) to mandate vehicle-to vehicle (V2V) communication technology for new light vehicles in the United States.



Vehicle to Vehicle (V2V) technology can help alert motorists of potentially threatening situations. Source: USDOT

Figure 11-1: Examples of Crash Scenarios and V2V Applications

In addition, automakers, technology companies and others are developing driverless vehicles, known as autonomous vehicles (AVs). Today's AVs are equipped with GPS, sensors, scanners, and cameras that "read" the roadways and detect and respond to other motorists, traffic signals, cyclists, and pedestrians. While the timetable for widespread adoption is unknown, AVs will likely play a significant role in passenger travel in 2040, especially in urban areas. Some places, like National Harbor, Maryland; Las Vegas, Nevada; and Lausanne, Switzerland, have already tested small, 15-passenger autonomous shuttles on local streets. The University of Michigan is expected to deploy a fleet of autonomous shuttles in 2018 to help transport students, staff, and visitors around campus. It is possible that future autonomous shuttles could be used to help transport people to/from transit stops, thus expanding "the reach" of traditional transit services and helping address the "first mile last mile problem" (where people cannot safely travel to/from transit). In addition, several companies are testing autonomous truck capabilities throughout the United States.

Today's semi-autonomous vehicles, like the Nissan Leaf (above), use sensors and cameras to detect traffic signals, other vehicles, pedestrians, and cyclists. Source: Fully Charged, YouTube, March 30, 2017

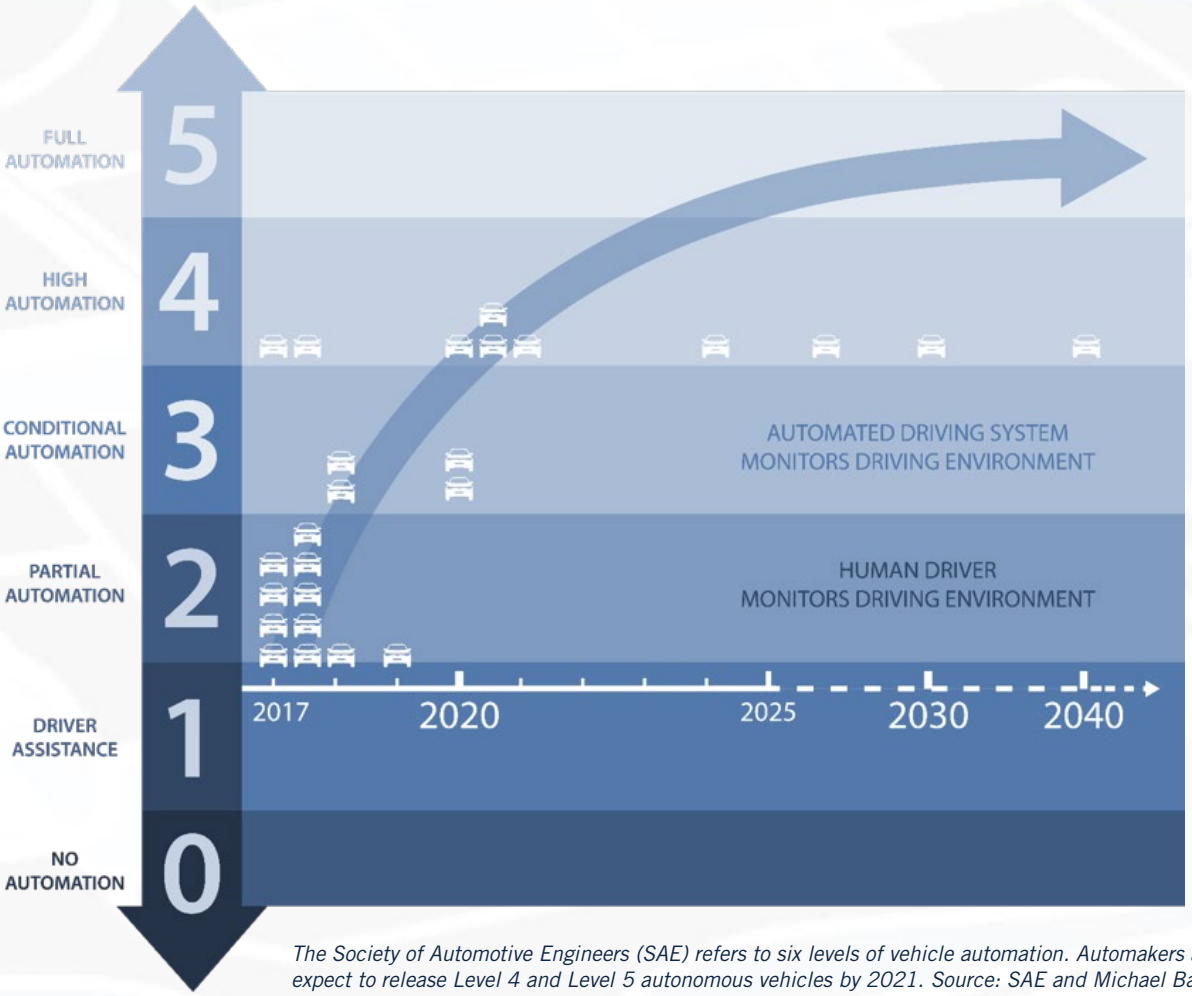


Figure 11-2: Levels of Vehicle Automation

The Society of Automotive Engineers (SAE) refers to six levels of vehicle automation. Automakers and tech. companies expect to release Level 4 and Level 5 autonomous vehicles by 2021. Source: SAE and Michael Baker International.

The Society of Automotive Engineers (SAE) refers to six levels of automation, ranging from 0 (no automation) to 5 (full automation), when categorizing vehicle-automation systems and the varying stages of driverless technology (**Figure 11-2**).

- **Level 0** – the human driver does everything;
- **Level 1** – an automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task;
- **Level 2** – an automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task;
- **Level 3** – an automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests;
- **Level 4** – an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions; and
- **Level 5** – the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

ELECTRIC VEHICLES

There are currently 16 electric vehicle (EV) charging stations in the region (4 in Berkeley County, 6 in Jefferson County, and 6 in Washington County). This US Department of Energy map lists all alternative fuel stations across the country. Users can enter a state to see a station count and search for alternative fueling stations near their location or along a driving route, as well as explore the data in an interactive way.

Effective July 1, 2017, the Maryland Energy Administration (MEA) will offer an Electric Vehicle Supply Equipment (EVSE) rebate program to an individual, business, or state or local government entity for the costs of acquiring and installing qualified EVSE. Between July 1, 2017, and June 30, 2020, rebates are up to the following amounts, for 40% of the costs of acquiring and installing qualified EVS.

- Individual – $700
- Business or State or Local Government – $4,000
- Retail Service Station Dealer – $5,000

In addition, MDOT recently submitted a request to FHWA to designate I-81 as a national EV corridor. If approved, I-81 will join a growing national network for alternative fueling and charging infrastructure along national highway system corridors.

In West Virginia, an Alternative Fueling Infrastructure Tax Credit income tax credit is available to eligible taxpayers who construct or purchase and install qualified alternative fueling infrastructure. The tax credit is 20% of the total allowable costs associated with construction or purchase and installation of the equipment, up to $400,000 per facility. This tax credit expires December 31, 2017 (Reference West Virginia Code 11-6D).

There are currently 16 electric vehicle charging stations in the region.

VIRTUAL WEIGH-IN MOTION

The Maryland Office of Traffic & Safety, Motor Carrier Division (MCD), has developed and deployed a network of electronic commercial motor vehicle (CMV) safety monitoring sites known as Virtual Weigh Stations (VWS). While one of the primary functions of these sites is to monitor vehicle weight activity, they can provide an abundance of other safety data such as speed, size, height, wheel spacing, images of defective equipment and unsafe driving practices. Two stations have been setup along I-81 as part of SHA's Virtual Weight Station Program. One station is on I-81 southbound at MD 58 and the other is on I-81 northbound at the Veterans Memorial Plaque. Planned enhancements through the retrofitting of License Plate Reader (LPR) technology will add more monitoring capability in the areas of credentialing (e.g. IFTA fuel tax, IRP registration, USDOT-CSA federal safety ratings and confirmation of hauling permit compliance). Additional monitoring integration with the NCIC stolen vehicle database is also under consideration.

PREPARING FOR THE FUTURE

It is important to understand how these new and emerging technologies could shape the future of transportation in our country and region. The following section reviews some of the potential advantages and concerns associated with connected and automated vehicles (CAV) and then discusses specific opportunities for the HEPMPO region.

POTENTIAL TRANSPORTATION ADVANTAGES

CAVs could change our travel behavior and improve roadway safety and efficiency. The following offer some brief insights into the potential benefits and opportunities associated with CAV.

Safety	Human error is responsible for approximately 90% of motor vehicle crashes. Motor vehicle safety could dramatically improve as CAVs communicate with each other and their surroundings (transportation and people).
Air Quality	The rise in electric, connected and automated vehicles could lead to a reduction in vehicle emissions, especially if CAV operate more efficiently than today's drivers/vehicles.
Traffic Congestion	CAVs, along with improved communications, could improve travel efficiency, increase traffic flow, and reduce non-recurring congestion caused by travel incidents.
Lower Driving Costs	Vehicle travel could become more affordable as people opt to use mobility-on-demand services over owning/operating their own vehicles.
Increased Transportation Options	CAVs could complement transit service and help connect passengers to/from transit stops. In addition, AVs could reduce the need for street parking, potentially freeing up space for non-motorized uses.
Non-driver Mobility	CAVs and mobility-on-demand services could offer unprecedented mobility for those who don't/can't currently drive, like: youth, aging seniors, people with disabilities, and those who cannot afford to own/operate a motor vehicle.
Convenience	CAVs and mobility-on-demand services could enable us to quickly dial up a driverless ride service and then relax, nap, stream media content, or work while en-route to our destination.
Faster Deliveries	CAVs and drone technology could facilitate the movement of goods and reduce delivery times.

POTENTIAL TRANSPORTATION CONCERNS

CAVs could also be prone to cybersecurity threats and contribute to additional travel and congestion. The following discuss some of the potential drawbacks and concerns with CAVs.

Safety and Security	CAVs could be susceptible to software failure, hacking or cyber-attacks in our increasingly digital world.
Air Quality	CAVs could make traveling easier/more convenient. This benefit, as well as the phenomenon of cars driving without passengers, could mean a greater number of trips, longer trips for daily tasks like commuting, and increased emissions/pollution.
Traffic Congestion	CAVs could lead to an increase in travel for people who cannot currently drive, such as seniors, youth, and people with disabilities. In addition, there could be empty vehicles driving around in between trips/fares.
Higher Driving Costs	Enhanced technology and safety features may increase the costs of vehicle ownership and maintenance, particularly during the transition period to autonomous vehicles.
Fewer Transportation Options	Fleets of autonomous, mobility-on-demand vehicles could dominate the transportation landscape, possibly leading to a reduction in transit service (as we know it today) and a decline in personal vehicle ownership.
Job Impacts	CAVs and mobility-on-demand vehicle fleets could eliminate the need for certain transportation jobs, such as delivery drivers, bus drivers, and taxi drivers.
Sprawling Development	CAVs could allow people to relax or perform other tasks while commuting, possibly negating the concern of working too far from home. This could result in sprawling development patterns as people move farther from their workplaces.
Reliance on Technology	CAVs could lead to a decline in driving skills and more reliance on technology. This could lead to safety issues if technology fails in a vehicle and a driver needs to take control of the vehicle.

OPPORTUNITIES FOR THE REGION

While CAV implementation will likely depend on Federal and State guidance, regions can still prepare for a variety of potential impacts and opportunities. Several potential opportunities for the HEPMPO are briefly discussed below.

- As more people use mobility-on-demand services, there may be less need for street parking and surface parking lots, particularly in cities like Hagerstown, Martinsburg, and Charles Town. This reduction in parking demand could offer tremendous opportunities to repurpose urban space for landscaping purposes and/or active transportation uses.
- Several freight stakeholders suggested that autonomous trucking could impact freight operations within 6-10 years. If so, I-81 and I-70 could benefit from early deployment of connected and automated trucks particularly since interstates will likely be the first locations for "mainstream" CAV deployment. The region should continue to work with the I-81 Corridor Coalition to understand how DOTs, MPOs, and private organizations can work together to understand and prepare for this monumental shift.
- As discussed in the Travel & Tourism section of Direction2045, there could be opportunities for an autonomous shuttle pilot program at Harpers Ferry, Antietam Battlefield, or at large regional shopping and entertainment centers, such as the Valley Mall and Hollywood Casino. The shuttles, like the "Olli" shuttle used at National Harbor in Maryland (right), can introduce residents and visitors to emerging transportation technologies. In addition, they can potentially improve accessibility for those who are unable to drive or walk and help reduce the number of cars searching for parking.
- If travel efficiency and vehicle through-put outpace increased travel demand, we may see people willing to tolerate longer distance commutes, particularly if they can accomplish other things (e.g. work or entertainment) while commuting in a driverless vehicle. As such, it is possible that more D.C.-area employees will opt live in Berkeley, Jefferson, and Washington counties, which will impact land use, population, and traffic patterns in the region. The MPO can work with the local jurisdictions to ensure that future growth and development occur in a sustainable fashion.

THE MPO'S ROLE

As a steward of the regional transportation network, the HEPMPO must constantly evaluate ways in which to improve transportation safety, mobility, and accessibility in Washington, Berkeley, and Jefferson counties. Technology is always changing and the HEPMPO, along with the region's transportation providers, must understand how these emerging technologies can affect the transportation system.

The HEPMPO should inform and educate the region's jurisdictions on emerging trends and changes in State and Federal guidance pertaining to mobility-on-demand services and CAV. The HEPMPO should keep pace with the guidance offered by the Association of Metropolitan Planning Organizations (AMPO) Technical Working Group, whose goal is to identify how best to leverage the benefits of CAV development and deployment. The HEPMPO should also work with the private sector, including automobile manufactures, aftermarket suppliers, and technology companies, to understand how to phase these emerging technologies into our traditional transportation system. In addition, the HEPMPO should work with freight companies to ensure that the transportation network can accommodate any changes in private sector demand, fleet mix, and operations.

As discussed above, there are concerns that these emerging transportation technologies could lead to higher driving costs and fewer transportation options. The HEPMPO should work with its member jurisdictions to ensure that transportation remains affordable for those who need it most, particularly the elderly and those who cannot afford to own or operate a personal vehicle.

The HEPMPO should also consider measuring the potential impacts of CAV in future transportation plans. Scenario Planning is one approach that allows transportation agencies to learn about the tradeoffs they will face in the future, while gaining a deeper understanding about how different future trends may affect transportation needs. The point of Scenario Planning is not necessarily to pick a future that is preferred (*what should happen*), but to explore a range of outcomes (*what could happen*). This allows agencies to be more strategic and nimble in their decisions about transportation investments and it gives them more time to consider and develop policies that will guide their region or state towards better outcomes as the future trends take place. The Federal Highway Administration (FHWA) recommends scenario planning for long-range transportation plans, and it provides examples and best practices on its website.

FUTURE STUDIES

Interagency coordination and HEPMPO's collaborate efforts with planning partner agencies and organizations have strengthened **Direction 2045** and led to the development of ideas for future studies. The recommended planning studies provided in this section reflect HEPMPO's continuing efforts of providing transportation planning support to meet the needs of the region, counties and local jurisdictions. The studies are not necessarily part of the project development process, but rather safety, corridor or regional planning studies intended to more fully assess needs that were identified by stakeholders and/or the transportation deficiency analysis in the development of this plan, and may serve as feasible solutions to address those needs. In addition, they support the planning efforts to pursue solutions and provide a basis for funding opportunities through state and federal grants.

CORRIDOR TRAFFIC SIGNAL IMPROVEMENT STUDY

With limited fiscal funding available for roadway capacity improvements (e.g. new travel lanes), many regions are focusing on lower-cost improvements to address safety and/or traffic congestion on important travel corridors. This study would focus on identifying viable locations for transportation system management (TSM) improvements, intersection and corridor-level signal coordination systems and other signalization alternatives including adaptive traffic control systems (ATCS). ATCS is a traffic management strategy in which traffic signal timing changes, or adapts, based on actual traffic demand. This is accomplished using an adaptive traffic control system consisting of both hardware and software.

REGIONAL FREIGHT STUDY

The roadways within the HEPMPO region provide an important role in supporting national and regional freight movement. The interstates, especially I-81, are among the highest freight corridors in the nation by truck percentage and are key access points to the local freight industry. However, high truck volumes do have significant impacts on safety and traffic congestion in the region. A regional freight study will focus on the identification of freight trends and issues, high freight growth areas including the airports, federal and state planning initiatives, regional commodity flows, and FAST Act performance measures. The study will also aim to gain further insights and collaboration from national, state and regional freight experts and local freight companies to better understand the needs and strategies that may be needed in the region.

PLANNING ENVIRONMENTAL LINKAGE STUDIES

Planning and Environmental Linkage (PEL) studies identify planning considerations and environmental features in the project study area prior to the project entering the Preliminary Design and National Environmental Policy Act (NEPA) phase of the project development process. Early identification of significant social and environmental features within proposed alternative corridors can assist the project development team in the identification and early screening of alternatives prior to the project reaching a more advanced point in the NEPA process where detailed analysis and changes can become more time consuming and costly. These decisions and analyses can be used to identify and prioritize future projects, develop the purpose and need for a project, determine project size or length, and/or develop and refine a range of alternatives.

One corridor identified for a PEL is the Route 9 reconstruction West of 1-81 to the Morgan County Line. This study will be coordinated with the West Virginia Department of Transportation Division of Highways (WVDOH). The adoption and use of a PEL study in the NEPA process is subject to determination by the Federal Highway Administration (FHWA). The results of the study will provide guidance on the project needs, feasibility and recommendation for moving the project forward.

ELECTRIC VEHICLE INFRASTRUCTURE PLAN

Electric Vehicles (EV) provide significant environmental benefits by reducing air pollution, greenhouse gases and fuel consumption. As the EVs become more affordable, their growth and popularity in the region and throughout the country has created a need for plug-in EV infrastructure to support this rising demand. A regional infrastructure plan will establish the framework for prioritizing public charging station locations to support concentrations of employment, retail, and recreation. The plan will provide best-suited charging equipment options, incorporate state planning efforts, review and update of local land management code to support or streamline permitting, private partnership opportunities, financial incentives and an implementation plan.

BICYCLE PLANNING

It is recommended that the HEPMPO build on the success of the City of Hagerstown Bicycle Master Plan and Regional Bicycle Plan and develop a bicycle and pedestrian plan for the City of Martinsburg and Charles Town/Ranson. The plan should evaluate existing bicycle and pedestrian infrastructure, engage stakeholders and the public, and formulate recommendations that reflect the varying needs of the communities. For example, safe pedestrian crossings may be the highest priority in Martinsburg, while traffic calming could be a high priority for Ranson. In addition, the HEPMPO should consider a bicycle study to link the C&O Canal Trail to the City of Hagerstown on US11. The plan should include a field element where staff interview local cyclists, pedestrians, and motorists to better understand their collective needs. The HEPMPO should continue to help implement the Regional Bicycle Study recommendations and provide technical assistance, when feasible, to communities applying for funding/grants. The HEPMPO should continue to incorporate travel and tourism in its future bicycle planning efforts.

REGIONAL TRANSIT SERVICE STUDY

A common limitation of transit service for multi-state areas is the inability to provide service across state lines. This study would develop an intercity transit plan to connect Hagerstown, Martinsburg and Charles Town including access to MARC stations. The study would develop service alternatives and coordination strategies that link communities and attractions within the MPO, as well as a link to other areas outside the MPO.

REGIONAL TRAFFIC SAFETY AND IMPROVEMENT STUDY

The regional traffic safety study will build upon the Maryland Strategic Highway Safety Plan and the West Virginia Highway Safety Program. **Direction 2045** provides a preliminary evaluation of crash rates and crash severity and identified several high need corridors and intersections. Further study is needed to evaluate the causes of crashes at these locations and recommend specific safety improvements. This study would require GIS mapping, coordination with local stakeholders, field visits, and a thorough analysis of historical crash data to identify recurring trends and contributing factors. To formulate recommendations, the study will need to evaluate key questions, such as:

- Did the crash involve a roadway departure (the #1 cause for fatalities and serious injuries)?
- Do crashes regularly occur at night (or in darkness)? Does weather play a role?
- What is the speed limit? Is it signed?
- Do crashes occur at sharp bends in the road? Are there blind spots?
- What are the lane widths?
- Are pedestrians or cyclists involved in the crashes?
- Was alcohol or distracted driving a contributing factor?

Recommendations will be developed to help reduce the frequency and severity of crashes and will reflect engineering, enforcement, education, emergency medical services, and equity. The recommendations should be context sensitive based on the surrounding environment and the contributing factors. For example, recommendations for a roadway departure (e.g. high friction surface treatments, edge line rumble strips, guardrails, traffic control devices) may be very different than recommendations for crashes involving a pedestrian in a downtown area. The study will identify the safety needs and focus on corridors like, Washington Street in Charles Town, US 40 Dual Highway and US 11 in Hagerstown that are high crash areas, and will support the highway safety targets that have been developed by the states and adopted by HEPMPO.

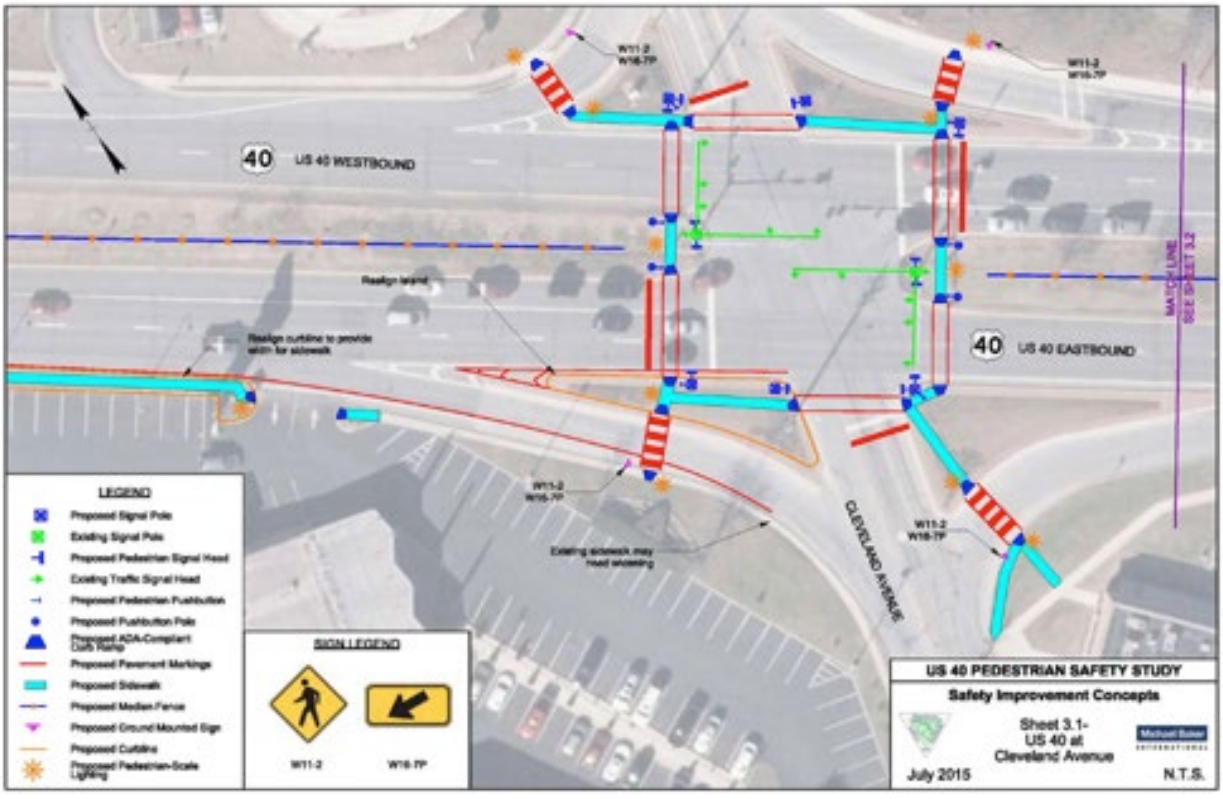
PEDESTRIAN ROAD SAFETY AUDITS

This study will utilize the Pedestrian Road Safety Audit (PRSA) methodologies conducted for the US 40 Dual Highway in Hagerstown in 2015. Corridors under consideration for a PRSA include:

- Edwin Miller Blvd in Martinsburg, WV
- Pennsylvania Avenue in Hagerstown, MD

The PRSA goal is to target selected State Highway corridors with a history of a high pedestrian fatalities and severe injuries for analysis and recommended improvement. Once a corridor is selected, a Pedestrian Safety Road Audit (PSRA) team is formed, comprised of federal, state and local transportation professionals and stakeholders, to evaluate existing deficiencies, identify opportunities, and provide recommendations to improve pedestrian conditions. FHWA guidelines state a PSRA is "the formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users." The overall objective of the PSRA is to:

- Document baseline conditions
- Promote awareness of pedestrian needs
- Produce concepts that reduce number and severity of pedestrian crashes
- Develop phased recommendations to be implemented as time and resources permit



PILOT PROGRAM EVALUATION OF AUTONOMOUS VEHICLE SHUTTLE / DEMO PROJECT

As recommended in the Travel & Tourism and Technology section, there could be opportunities for an autonomous shuttle pilot program, similar to the one utilized at National Harbor. The pilot could introduce the emerging (and seemingly inevitable) technologies to the public, helping ease the adoption and deployment of connected and automated vehicles (CAV).

Further study is needed to evaluate the feasibility of this initiative at locations, such as: Harpers Ferry, Antietam National Battlefield, and/or the Hollywood Casino. The study would require stakeholder coordination with public and private entities, an evaluation of comparable case studies, development of alternatives, and recommendations for implementation.

ADA TRANSITION PLANS / ADA ASSISTANCE PLANS

In accordance with the Americans with Disabilities Act (ADA), local governments are required to develop a self-evaluation of the program and services provided to the public. The commitment of all municipalities is to ensure appropriate, safe and adequate pedestrian access to public rights of way regardless of ability or disability. The transition or assistance plan will address barriers to accessibility in public maintained rights of way, recommend potential mitigation solutions, estimate funding requirements and provide a framework to implement the mitigation measures.

GRANT APPLICATION ASSISTANCE

Opportunities for state or federal grants are frequent as additional funding becomes available and notice of funding opportunities (NFO) are released. HEPMPO has supported the I-81 FASTLANE and INFRA grant applications. The HEPMPO can provide technical and application writing support with one or several municipalities or State DOTs to pursue significant funding, such as a TIGER Grant. The grant application will require extensive outreach, political support, and a technical benefit-cost analysis whereby the anticipated project benefits and costs are monetized and discounted to a net present value.

LONG RANGE TRANSPORTATION PLAN