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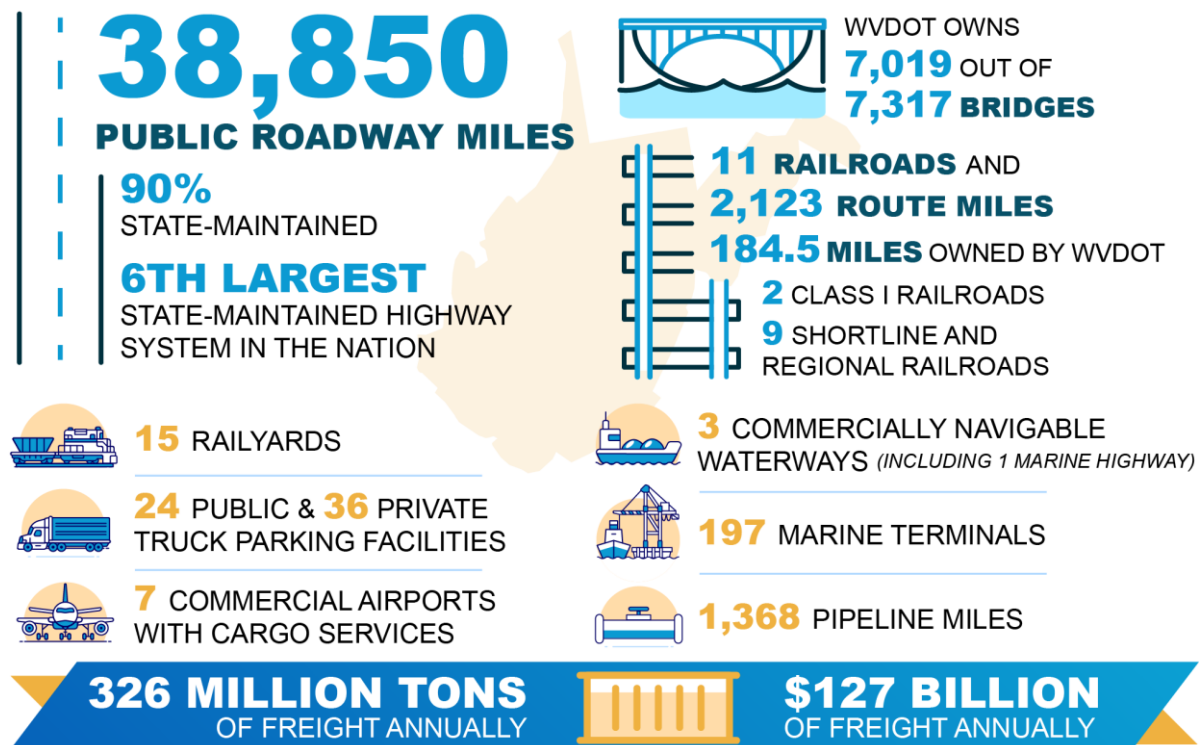
1.0 WEST VIRGINIA 2023 STATE FREIGHT PLAN OVERVIEW

Why are we developing a Freight Plan? ♦ What is our approach and how did we work with our partners? What are our objectives and how does the Plan fit into existing WVDOT processes? ♦ How does the Plan address Federal requirements?

West Virginia's economic vitality and quality of life depend greatly on how well the State's freight transportation network moves goods and materials. The State's freight network plays a critical role in the daily life of West Virginia's residents and businesses—delivering goods to the State's businesses and residents, keeping manufacturing facilities operating, the store shelves stocked, the medicine flowing at healthcare facilities, and food on the table.

In West Virginia, freight moves through a transportation system that encompasses all modes (see Figure 1). The State is served by 38,850 miles of public roadway (90 percent is state-maintained), the 6th largest State-maintained highway system in the Nation, inland waterways and ports, two Class I railroads and various regional and short line railroads with multiple rail terminals, a robust pipeline network, and seven commercial service airports which can provides cargo services. The State's multimodal freight network connects businesses, and consumers in all parts of the State, across the U.S., and with international markets. Every year, about 326 million tons (\$127 billion dollars)¹ of freight flow into, out of, and within West Virginia.

Figure 1. West Virginia Freight System by the Numbers



¹ Federal Highway Administration (FHWA) Freight Analysis Framework version 5.4.1 (FAF5).

The State's freight infrastructure faces continually shifting demands due to changing macroeconomic, social, and environmental trends and developments, including:

- Changes in demographics, including an aging population.
- Ongoing challenges at the State and national level to adequately fund transportation solutions.
- Climate change impacts on agriculture, tourism, and infrastructure.
- Shifts in world markets, including disruptions from conflicts.
- Continuing impacts from the COVID-19 pandemic or other public health crises.
- Technological advances in transportation services, systems, and vehicles.
- Transitions in the State's economy and industrial base.
- Increasing demand for same-day and next-day deliveries.

Collectively, these trends and developments will continue to stress the capacity and operations of the State's freight transportation network. As West Virginia adapts to these changing conditions in an era of constrained resources, the West Virginia Department of Transportation (WVDOT) must continue to balance freight mobility needs with passenger needs, environmental, social, and financial concerns while addressing rapidly rising maintenance costs on aging infrastructure.

The purpose of the 2023 West Virginia State Freight Plan (Freight Plan) is to fulfill the obligation of WVDOT to meet all Federal guidelines and requirements, including responding to emerging policy direction within the Infrastructure Investment and Jobs Act (IIJA, also known as the Bipartisan Infrastructure Law). The Freight Plan focuses on recommended strategies and implementation, and positions the State to compete for freight focused formula and discretionary funding. The Freight Plan builds upon WVDOT's library of recent transportation plans and programs, incorporates national freight planning best practices for data analytics, and synthesizes input from key public- and private-sector freight stakeholders throughout West Virginia.

This Freight Plan was developed using an approach that links together various analyses—state of the freight system, freight activity, commodity flows, economic trends, industry supply chain trends, and needs assessment. This interconnected approach created a framework to identify critical infrastructure, operational, and institutional-related needs and priorities impacting the State's freight transportation system, and set a path for WVDOT to meet agency goals as well as those of this Plan.

1.1 Organization of the Plan

This Freight Plan includes an Executive Summary and the following sections:

- [Section 1.0: West Virginia 2023 State Freight Plan Overview.](#)
- [Section 2.0: Freight's Importance to the WV Economy.](#)
- [Section 3.0: WV's Multimodal Freight Infrastructure.](#)
- [Section 4.0: WV's Freight Challenges and Opportunities.](#)
- [Section 5.0: Freight Strategies and Investments.](#)

The Freight Plan refers readers to supporting technical memos that include the following and can be accessed on the [WVDOT Freight Plan website](#):

- *Highway Freight Modal Profile*
- *Freight Rail Modal Profile*
- *Ports and Waterways Modal Profile*
- *Air Cargo Modal Profile*
- *Pipeline Modal Profile*
- *Commodity Flow Profile*
- *Truck Parking Profile*
- *Survey Results Summary Report*

1.2 Plan Vision and Goals

Development of the Freight Plan is shaped by a vision, goals, and objectives. These statements help shape the needs assessment and development of strategies, while also establishing a system to monitor plan implementation and system performance over time.



Vision describes the desired future state of West Virginia's transportation system.



Goals describe what guides WVDOT and its partners toward attaining the vision.



Objectives describe how we are going to attain the vision and represent our desired outcomes.



Measures quantify objectives, enabling us to assess the degree to which WVDOT activities and performance of the system is achieving objectives.

Development of the vision focused on consistency with WVDOT's current mission statement. The current WVDOT mission is presented in Figure 2.

Figure 2. Freight Plan Vision—Mission of WVDOT

THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION'S MISSION IS TO RESPONSIBLY PROVIDE A SAFE, EFFICIENT AND RELIABLE TRANSPORTATION SYSTEM THAT SUPPORTS ECONOMIC OPPORTUNITY AND QUALITY OF LIFE.

The [National Multimodal Freight Policy](#) established 10 goals to ensure the National Multimodal Freight Network provides a foundation to compete in the global economy and the [National Highway Freight Program](#) (NHFP) established seven goals to inform implementation of the program to improve the efficient movement of freight. WVDOT reviewed these goals as well as mission and vision statements, goals, and objectives across Federal and state agencies, industry partners, and insights collected from the Freight Advisory Committee (FAC).

The review reached a conclusion that the Freight Plan should be structured around the same goals as WVDOT's statewide long-range transportation plan (LRTP) to enable consistency, while customizing objectives to reflect specific freight transportation system needs and the unique national freight policy and program goals. Table 1 presents the resulting Freight Plan goals and objectives.

Table 1. Plan Goals and Objectives

Goals	Objectives
System Condition, Efficiency, and Fiscal Sustainability Maintain multimodal and intermodal freight transportation infrastructure in a state of good repair and manage life-cycle costs; efficiently deliver projects, programs and services supporting goods movement; and work to maintain existing funding mechanisms while exploring new alternative and sustainable funding mechanisms.	Maintain the existing freight transportation system and freight assets in a state of good repair.
	Invest in innovative technologies and program delivery strategies supporting freight movement.
	Explore new and sustainable revenue options which fund freight investments.
Safety and Security for All Users Reduce transportation fatalities and serious injuries involving freight vehicles, improve the safety and security of drivers, cargo, and intermodal facilities, and improve the resilience of the freight system particularly to severe weather events and other disruptions.	Reduce fatalities and serious injuries on the multimodal transportation system.
	Enhance the safety and security of freight operators and cargo.
	Manage a resilient and redundant freight transportation network.
Economic Vitality Strengthen the ability of communities and industries to access national and international trade markets, retain and grow existing West Virginia (WV) statewide and regional economic focus sectors, and support regional economic development that will diversify WV's economy.	Improve intermodal freight connections, and expand direct freight access to economic activity centers and emerging industries/clusters.
	Address highway freight bottlenecks and improve first-mile/last-mile access.
	Partner with universities, community colleges, and workforce training programs to educate and train new freight operators and supporting workforces.
Multimodal Mobility, Reliability, and Accessibility Facilitate freight mobility and connections for on-demand and reliable goods delivery across all WV communities, including critical services such as health care and emergency management.	Improve freight network reliability, reduce incident clearance time and recovery, and enhance management of operational disruptions on freight corridors.
	Improve access and availability of designated and safe truck parking facilities.
	Create new opportunity for access to key destinations and jobs for underserved or disadvantaged populations.
Livable and Healthy Communities Create freight transportation systems that operate efficiently and cleanly, protect the natural environment and maintain access for residents and visitors to experience WV's natural and cultural destinations.	Reduce emissions from freight movement.
	Mitigate environmental and community impacts from freight movement.
	Coordinate freight land use and transportation decisions.

1.3 Alignment with West Virginia's LRTP

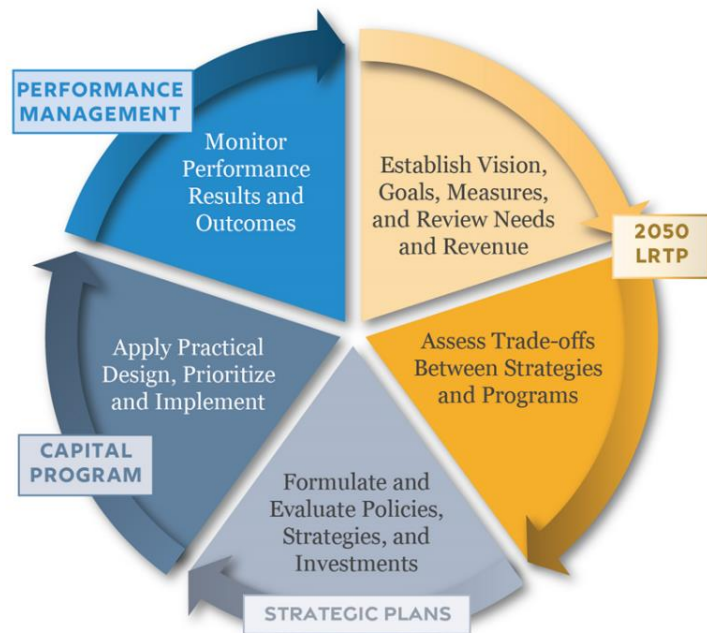
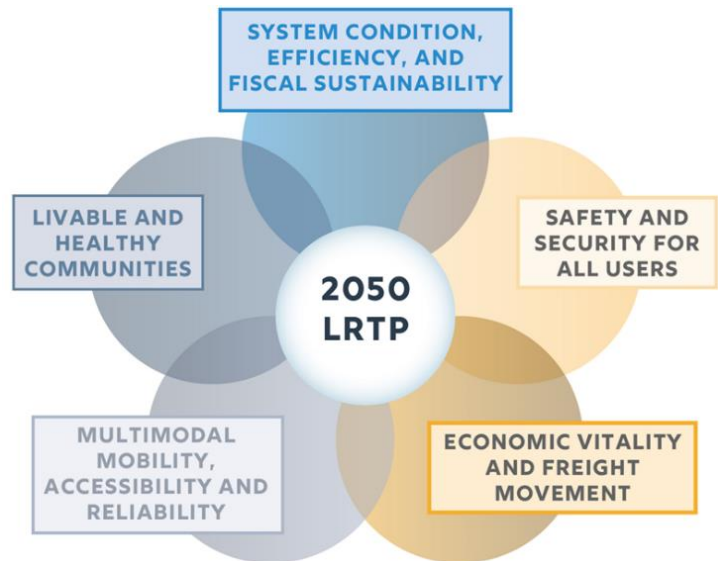
WVDOT's statewide LRTP was completed in September 2021. The LRTP assesses the current and future condition of West Virginia's multimodal transportation system through 2050, identifies transportation priorities and funding options to prepare for future challenges and opportunities, and provides a blueprint to strategically preserve, modernize, and manage the State's assets for future generations. The approach was shaped around a five-step process featuring public and stakeholder engagement that developed strategies and actions to support the plan goals.

The goals are an extension of WVDOT's mission statement and align with the U.S. Department of Transportation (U.S. DOT) goals and transportation planning factors. Goals are operationalized through objectives and implementation recommendations in the LRTP are organized around 13 high-priority strategies, and delivered through 24 high-priority actions.

The Freight Plan goals align with the goals identified within the 2050 LRTP. This alignment is important in order to ensure consistent approaches among various planning activities and consistent direction for future investment decisions.

The LRTP is WVDOT's decision guide on managing and modernizing our transportation system to improve safety and mobility for West Virginia today and tomorrow. The LRTP helps WVDOT plan strategically, program capital investments, and manage performance guided by statewide transportation goals which maximize opportunities and reduce risks as transportation needs and revenues change. The Freight Plan is a strategic plan, extending the LRTP by evaluating strategies and investments to address freight needs in West Virginia, and setting the path for investment decisions in future capital programs, including the Statewide Transportation Improvement Program (STIP).

More information on the 2050 LRTP is available [here](#).²



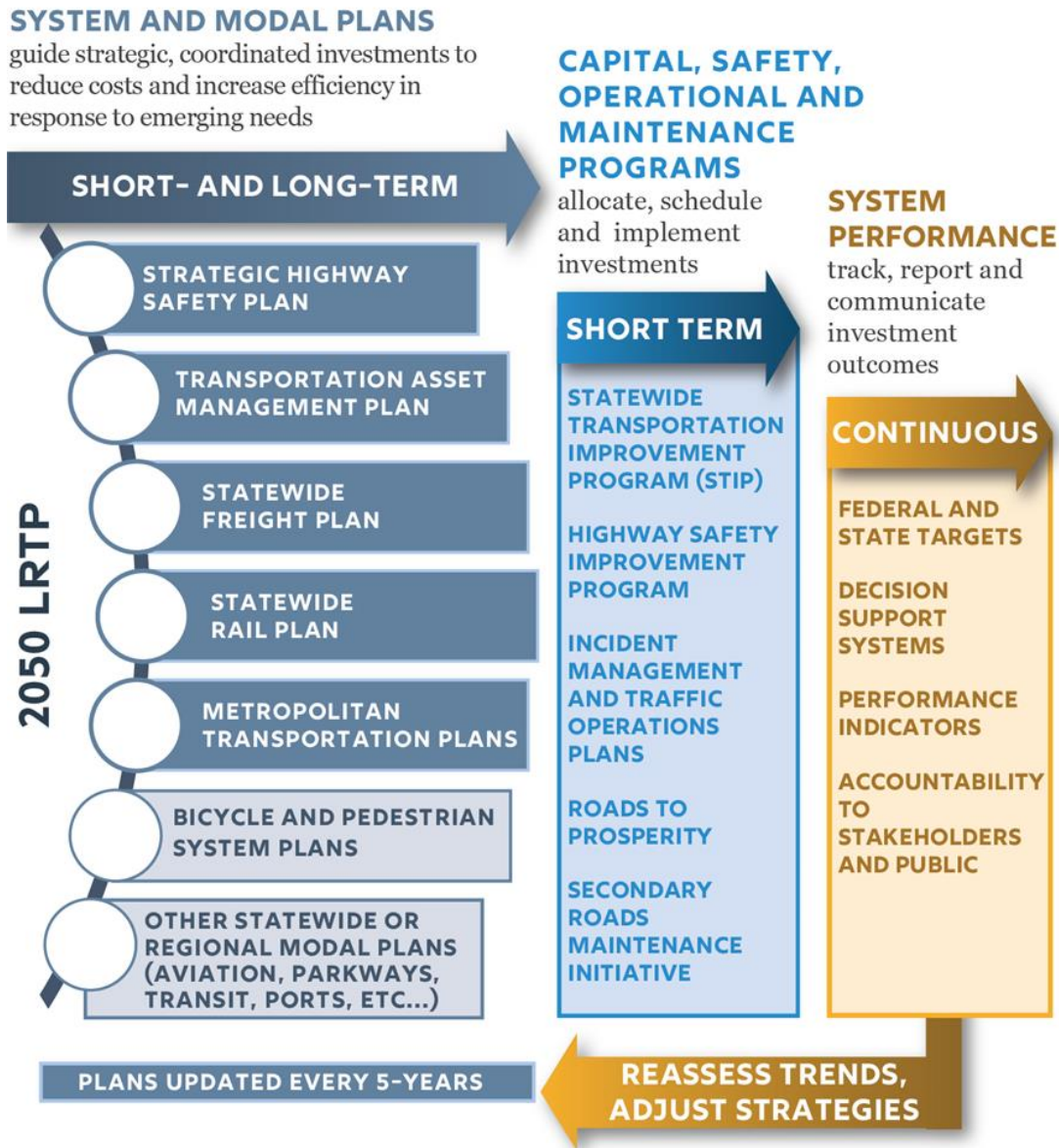
WVDOT's Transportation Planning Lifecycle

1.4 Alignment with West Virginia's Statewide Plans

WVDOT recognizes that there is a family of system and modal plans that create connections between the goals, objectives, strategies, and actions within the 2050 LRTP to investments identified within the STIP and other capital programs. Implementation of these capital programs and the impacts on performance of the transportation system help inform recurring plan updates.

² <https://transportation.wv.gov/highways/programplanning/LRTP/Pages/default.aspx>.

The [State Rail Plan](#)³ was completed in 2020, the 2050 LRTP in 2021, and in 2022 WVDOT updated the [Strategic Highway Safety Plan \(SHSP\)](#)⁴, the [Transportation Asset Management Plan \(TAMP\)](#)⁵ and the Highway Rail Crossing Safety Action Plan (SAP). West Virginia's eight [metropolitan planning organizations \(MPO\)](#)⁶ routinely update metropolitan transportation plans (MTP) per Federal requirements, and develop other regional plans, including freight plans. The Freight Plan acknowledges specific relationships to these statewide and regional plans, including connection across goals, objectives, strategies, and targeted recommendations.



³ <https://transportation.wv.gov/rail/2020WVSRP/Pages/default.aspx>.

⁴ <https://transportation.wv.gov/highways/traffic/Documents/StrategicHighwaySafetyPlan.pdf>.

⁵ <https://transportation.wv.gov/highways/PerformanceManagement/Pages/Asset-Management-Program-System-Performance-Measures.aspx>.

⁶ <https://transportation.wv.gov/highways/programplanning/statewide/Pages/wvmpo.aspx>.

1.5 Alignment with Federal Requirements

This 2023 West Virginia State Freight Plan has been developed by WVDOT in accordance with Federal guidelines for state freight plans as outlined in the IIJA signed into law on November 15, 2021. The Freight Plan fulfills Federal requirements for state freight planning, identifies opportunities for West Virginia to invest in its freight system, and positions WVDOT to take full advantage of Federal formula and discretionary funding programs for freight transportation investments. Table 2 serves as a guide to reading this plan and its alignment with Federal requirements.

Table 2. Federal Freight Plan Requirements Summary

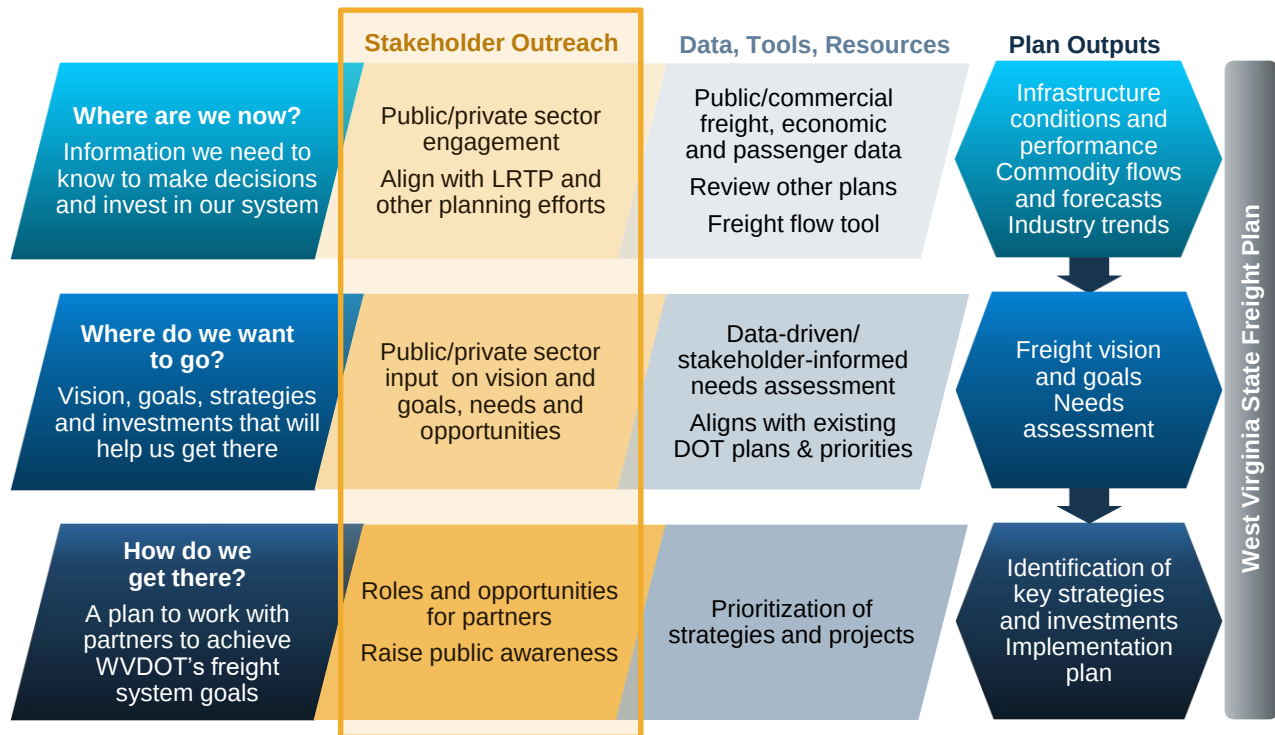
Item	IIJA Requirement	State Freight Plan Reference(s)
A	Identification of significant statewide freight trends, needs, and issues	Sections 3.0 and 4.0
B	Description of freight policies, strategies, and performance measures that will guide freight-related transportation investment decisions	Sections 4.0 and 5.0
C	Critical multimodal rural freight facilities and rural and urban freight corridors	Section 3.0
D	Link to national multimodal freight policy and highway freight program goals	Section 1.0
E	Description of how innovative technologies and operational strategies (including intelligent transportation systems [ITS]) that improve the safety and efficiency of freight movements were considered	Sections 3.0 and 5.0
F	Description of improvements to reduce roadway deterioration by heavy vehicles (including mining, agricultural, energy cargo or equipment and timber vehicles)	Sections 3.0, 4.0, and 5.0
G	Inventory of facilities with freight mobility issues and a description of the strategies the State is employing to address the freight mobility issues	Sections 3.0 and 5.0
H	Description of significant congestion or delay caused by freight movements and any mitigation strategies	Sections 3.0 and 5.0
I	Freight investment plan that includes a list of priority projects and describes investment and matching funds	Section 5.0
J	Consultation with the State freight advisory committee	Section 1.0
K	Assessment of commercial motor vehicle parking facilities	Section 3.0
L	Description of supply chain cargo flows	Section 2.0
M	Inventory of commercial ports	Section 3.0
N	Discussion of the impacts of ecommerce on freight infrastructure	Sections 2.0 and 4.0
O	Considerations of military freight	Section 3.0
P	Strategies and goals to decrease a) the severity of impacts of extreme weather and natural disasters on freight mobility; b) the impacts of freight movement on local air pollution; c) the impacts of freight movement on flooding and stormwater runoff; and d) the impacts of freight movement on wildlife habitat loss	Sections 4.0 and 5.0

1.6 Overview of Stakeholder Engagement

The Freight Plan was developed with input from the West Virginia FAC, WVDOT agencies and leadership, regional planning partners, and freight stakeholders. These advisors, stakeholders, and subject matter experts validated the vision and goals; offered insight on local and regional freight-related issues, trends, and

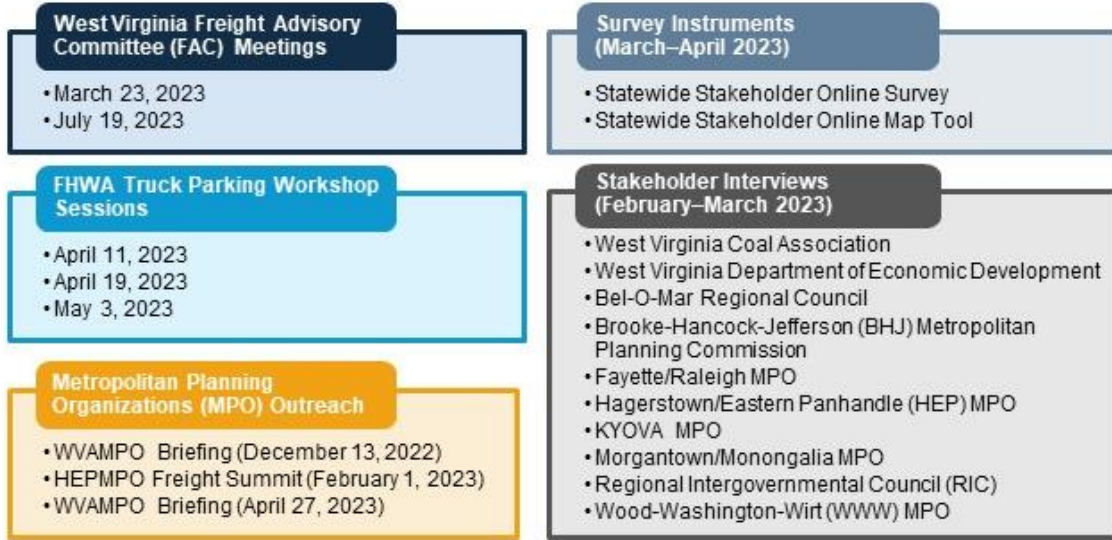
needs; shared information with the represented institutions/organizations; and informed recommendations, solutions, and strategies. The role of stakeholder outreach within the overall Freight Plan approach is demonstrated in Figure 3. The support and guidance of the stakeholders ensure that the Freight Plan has achievable, realistic, and beneficial goals. Meeting these goals, through strategies developed with the stakeholders and ultimately implemented by WVDOT and its partners, will support the long-term viability and functionality of critical freight infrastructure necessary for the safe and efficient movement of goods across West Virginia.

Figure 3. Stakeholder Outreach Overview



The engagement of freight decision-makers and stakeholders in the planning process was achieved through two FAC meetings, three Federal Highway Administration (FHWA) truck parking workshop sessions, MPO briefings, an online survey and online map tool, and interviews with MPOs and other freight stakeholders. A summary of these activities and their timelines are shown in Figure 4. The remainder of this section will provide an overview of these activities and their outcomes.

Figure 4. Stakeholder Engagement Activities



1.6.1 Freight Advisory Committee

WVDOT convened the West Virginia FAC by videoconference two times through the plan development process: (1) to introduce the Committee to the team and scope, present the findings to date of the freight system existing conditions, and request input on the Plan vision, goals and objectives; (2) to provide high-level policy guidance on issues and strategies as well as feedback on major findings and Plan highlights. The FAC is comprised of the WVDOT, MPOs, Federal, regional and local partner agencies, and freight stakeholders. The FAC members include both the public and private sectors and reflect the diversity of West Virginia's freight infrastructure users.

FAC meetings were held on March 23, 2023, and July 19, 2023. The participants of the FAC are listed below:

- Appalachian and Ohio Railroad
- Bel-O-Mar Regional Council
- Berkeley Co. Development Authority
- Brooke-Hancock-Jefferson (BHJ) MPC
- CSX Transportation
- Dept of Environmental Protection
- Division of Natural Resources
- Fayette/Raleigh MPO
- FHWA WV
- Federal Motor Carrier Safety Administration
- Hagerstown/Eastern Panhandle MPO
- Procter & Gamble
- Public Service Committee
- Regional Intergovernmental Council
- RJ Corman—West Virginia Line
- U.S. Coast Guard
- Volvo Group
- Wheeling and Lake Eric Railway
- Wood-Washington-Wirt (WWW) Interstate Planning Commission (IPC)
- WV Coal Association
- WV Economic Development Authority (EDA)

- I 81 Corridor Coalition
- Kanawha River Railroad (Watco Companies)
- KYOVA IPC
- Martin Marietta Materials
- Morgantown Monongalia MPO
- Norfolk Southern
- National Transport and Safety Authority—Governors Highway Safety Office
- OmniTrax—Winchester and Western Railroad
- Owner-Operator Independent Drivers Association
- WV Department of Economic Development
- WV Manufacturers Association
- WV Route 2/I 68 Authority
- West Virginia Division of Highways (WVDOH)—Planning Division
- WVDOH—Right-of-Way Division
- WVDOH—Information Technology Division
- WVDOT—Division of Multimodal Transportation Facilities—Aeronautics
- WVTA—WV Trucking Association

Feedback from the FAC meetings was collected and incorporated into the development of the Freight Plan. Some of the key findings from the FAC meetings were the stakeholders' interest in maintaining existing infrastructure, commitment to safety, need to address highway freight bottlenecks and improve first-mile/last-mile access, coordinate freight land use and transportation decisions, and call to address truck parking issues across the State.

1.6.2 Stakeholder Interviews

Ten interviews were conducted by videoconferencing with WVDOT planning partners, and freight and industry stakeholders. An interview guide was sent out to interview participants in advance allowing the participants to prepare data and responses. These structured interviews were used to compile general considerations and issues specific to the organization's region of influence, freight and industry trends, infrastructure needs and areas of congestion, needs and considerations specific to various freight modes, policy and institutional needs, industrial access issues, safety issues, truck parking issues, and issues related to environmental justice. The following public and private stakeholders were interviewed:

- Bel-O-Mar Regional Council
- Brooke-Hancock-Jefferson MPC
- Fayette/Raleigh MPO
- Hagerstown/Eastern Panhandle MPO
- KYOVA MPO
- Morgantown Monongalia MPO
- Regional Intergovernmental Council
- West Virginia Coal Association
- West Virginia Department of Economic Development
- WWW MPO

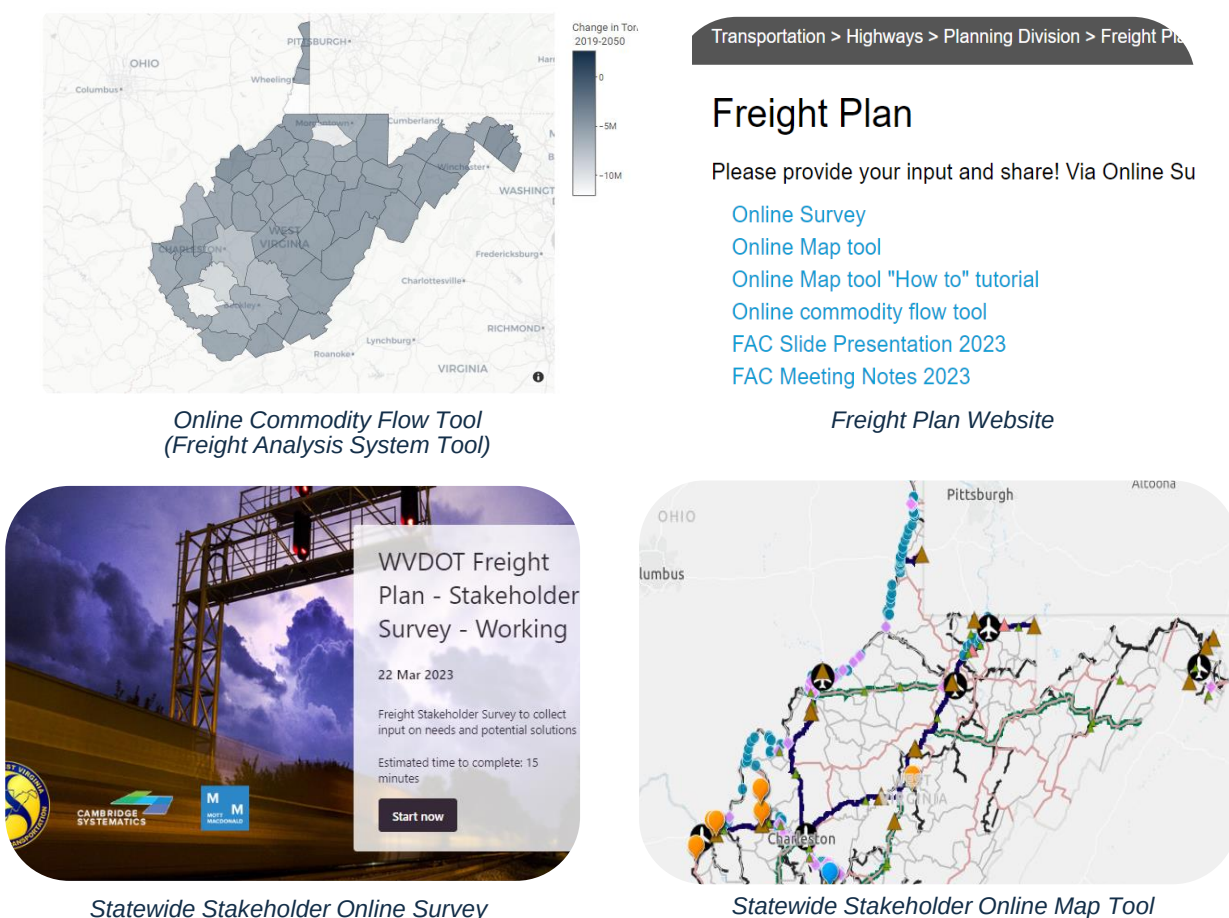
In addition, MPOs were further engaged by presenting on the West Virginia State Freight Plan progress at MPO-organized briefings and summits. The project team provided an overview of the Freight Plan at the December 13, 2022, West Virginia Association of MPOs meeting and the February 1, 2023, Hagerstown/Eastern Panhandle MPO Freight Summit. Additionally, the project team provided an update on the development of the Freight Plan at the April 27, 2023, West Virginia Association of MPOs meeting. As several of the MPOs have been developing freight plans/studies specific to their areas, these interactions allowed for the needs and opportunities identified in their regions to be included in the State Freight Plan.

1.6.3 Online Tools and Survey Instruments

Multiple online tools were used to share information and gather insights from stakeholders. An overview of each of these tools is shown in Figure 5. The West Virginia Freight Analysis System Tool was developed to provide dynamic and graphical visualizations of commodity flow data—allowing stakeholders to view freight flows at local or statewide levels. On the WVDOT website, a dedicated webpage made Freight Plan materials available to stakeholders. The website served as the primary public information tool and disseminated information and updates throughout the study.

In March and April of 2023, a Statewide Stakeholder Online Survey was distributed to stakeholders and published on the Freight Plan webpage to gather feedback on the needs, strengths, weaknesses, and trends impacting the freight system in West Virginia. The questions were designed to require less than 20 minutes to complete. An online needs mapping tool accompanied the online survey enabling respondents to pinpoint the locations of freight needs, trends, and opportunities across the State. A full list of the online survey and survey findings is provided in the *Survey Results Summary Report*.

Figure 5. Stakeholder Online Tools and Survey Instruments



1.6.4 FHWA Truck Parking Workshop

FHWA held three truck parking workshop sessions on April 11, 2023, April 19, 2023, and May 3, 2023, which supported the development of the West Virginia State Freight Plan and members of the FAC were invited to participate. Speakers from WVDOT, WV MPOs, Colorado Department of Transportation (DOT), North Carolina DOT, Real Women in Trucking, and the National Association of Truck Stop Operators, were invited to present from their perspective on the challenges with truck parking, solutions for capacity improvements, current efforts to improve/support truck parking, and concerns or opportunities specific to West Virginia or other states that could be applicable to West Virginia. The workshop was used to identify truck parking issues, needs and trends across the State; review effective practices and solutions for addressing truck parking challenges; provide opportunities for stakeholders to share effective practices; and identify possible solutions to truck parking issues in West Virginia. The information gained from these workshop sessions enhanced the content related to truck parking in the Freight Plan.

2.0 FREIGHT'S IMPORTANCE TO THE WV ECONOMY

What are the linkages between West Virginia's economy and freight movement? ♦ What are the most important trends driving freight and economic vitality in the State? ♦ What are West Virginia's key freight-related industries? ♦ What goods are moving to, from, within, and through West Virginia?

2.1 Freight and Economic Trends

The freight and goods transported across West Virginia's multimodal transportation system support nearly every aspect of everyday life. This ranges from the construction materials and energy sources used to build and power homes and businesses, to the food consumed at restaurants, and everyday goods sold across the State. As a result, the characteristics of freight movement in West Virginia are impacted by various external trends. For the purposes of accurately assessing statewide freight system needs, a strong understanding of these trends is necessary. As the birthplace of petrochemicals which play a role in nearly every consumer product, West Virginia, and especially the State's cities located on the Ohio River, remain strong and growing hubs for production. The State remains in strong position to capitalize on key industries such as building materials, and growing industries such as electric vehicles and renewable energy, as highlighted by recent investments across the State. Examples include a \$3.1 billion steel manufacturing plant in Apple Grove⁷, a \$450 million micro mill in Berkely County⁸, a \$500 million first-of-its-kind renewable energy microgrid-powered industrial site in Ravenswood⁹, a \$760 million iron-air manufacturing facility in Weirton¹⁰, and a large number of warehouse and distribution centers in the Tabler Station area along I-81.¹¹

On the other hand, economic uncertainty and fears of a looming national recession may dampen statewide freight production. The first quarter of 2023 saw the growth rate of the national economy slow to an annual pace of 1.1 percent, which marks a significant slowdown from previous years. This slowing growth has been driven in part by rising interest rates, a decline in the housing market, and businesses looking to reduce inventories.¹² In direct relation to statewide freight trends, West Virginia continues to struggle with a declining workforce population, as well as driver and truck parking shortages. These trends are often further magnified by the State's rural geography. Existing industries and new economic opportunities are likely to position West Virginia to see sustained growth in economic production and freight activity. Table 3 briefly summarizes some of the key statewide and national trends that will shape this growth during the 2020s and beyond. These trends are shaped by statewide and regional changes in population and economics, while responding to national policy and international markets.

⁷ <https://nucor.com/news-release/19651>.

⁸ [https://governor.wv.gov/News/press-releases/2022/Pages/Gov.-Justice-and-Commercial-Metals-Company-\(CMC\)-announce-new-Micro-Mill-in-Berkeley-County.aspx](https://governor.wv.gov/News/press-releases/2022/Pages/Gov.-Justice-and-Commercial-Metals-Company-(CMC)-announce-new-Micro-Mill-in-Berkeley-County.aspx).

⁹ <https://www.wdvt.com/2022/09/13/business-invest-500-million-west-virginia-new-hub/>.

¹⁰ <https://www.theintelligencer.net/news/top-headlines/2022/12/760m-battery-plant-to-locate-in-weirton-bring-up-to-750-jobs/>.

¹¹ <https://wvmetronews.com/2022/08/15/huge-plat-of-tabler-station-logistics-park-acquired-along-i-81-cooridor/>.

¹² <https://apnews.com/article/economy-gdp-inflation-Federal-reserve-jobs-consumers-5d725b42df6f5364058510bad83afc82>.

Table 3. West Virginia Freight and Economic Trends

Trend Categories	Details
Transportation Funding ^{1,2}	2021 IIJA establishes a \$567 billion program to support the Nation's surface transportation system over the next five years. \$78 billion dedicated to freight investments. - For West Virginia, this includes \$3.7 billion in formula funding for highway and bridge investments and \$17.2 million for funding to augment commercial motor vehicle safety efforts to reduce crashes. - The IIJA increases opportunities to compete for discretionary grants, including the \$12.5 billion Bridge Investment Program for economically significant bridges and nearly \$16 billion dedicated for major projects that will deliver substantial economic benefits to communities. - The IIJA also includes programs to increase resiliency and sustainability in DOT operations. Agencies can reduce local funding match requirements for PROTECT Formula Program applications by developing Resilience Improvement Plans.
Energy ^{3,4}	- Statewide production totals for both natural gas and coal are expected to increase in 2023. - Despite recent declines in total production from 2000 through 2022, coal still accounts for over 90 percent of statewide energy usage.
Supply Chain Distribution and Management ^{5,6}	- In 2022, state exports increased by 20 percent to approximately \$7.6 billion. This included strong growth in coal, chemicals, metals, and plastics. - The State's Eastern Panhandle has seen significant economic growth. New and recently completed facilities have been constructed by Commercial Metals Company, Clorox, and Speedway Motors. - Demand is increasing for battery storage and production to support the growing renewable energy and electric vehicle industries.
Ecommerce ⁷	- After growing by approximately 10 percent annually, ecommerce sales have started to stagnate. - The Eastern Panhandle will likely remain an important and growing ecommerce cluster given the proximity to larger domestic markets along the Eastern Seaboard.
Changing Workforce ^{8,9}	- Workforce West Virginia has several programs that target freight and manufacturing-related workforce shortages. - Smaller railroad companies are in pursuit of eliminating Two-Person Crew requirements in rail cabs. Trucking companies still continue to have challenges attracting drivers.
Technology ¹⁰	- Ongoing studies for automated and connected vehicles are providing opportunities for new targeted investments in vehicle and driverless technology. - Since 2021, approximately \$500 million has been invested in statewide broadband expansion.

¹ <https://nacto.org/wp-content/uploads/2021/08/NACTO-IIJA-City-Overview.pdf>.

² <https://infrastructure.wv.gov/Pages/default.aspx>.

³ <https://minesafety.wv.gov/historical-statistical-data/production-of-coal-and-coke-1863-2013/>.

⁴ https://www.eia.gov/dnav/ng/hist/na1160_sww_2a.htm.

⁵ <https://governor.wv.gov/News/press-releases/2023/Pages/West-Virginia-exports-increase-by-over-20-percent,-state-delivers-second-largest-amount-of-coal-in-United-State.aspx#:~:text=The%20top%20five%20export%20sectors,the%20aerospace%20and%20defense%20sectors>.

⁶ <https://business.wvu.edu/files/d/4dfda923-73d5-4aaa-a4d0-21515e73b901/eastern-panhandle-economic-outlook-2019-2023.pdf>.

⁷ <https://business.wvu.edu/files/d/4dfda923-73d5-4aaa-a4d0-21515e73b901/eastern-panhandle-economic-outlook-2019-2023.pdf>.

⁸ <https://workforcewv.org/>.

⁹ <https://www.aar.org/issue/crew-size/>.

¹⁰ <https://landline.media/west-virginia-law-authorizes-autonomous-vehicles/#:~:text=A%20new%20West%20Virginia%20law,on%20state%20roadways%20and%20highways>.

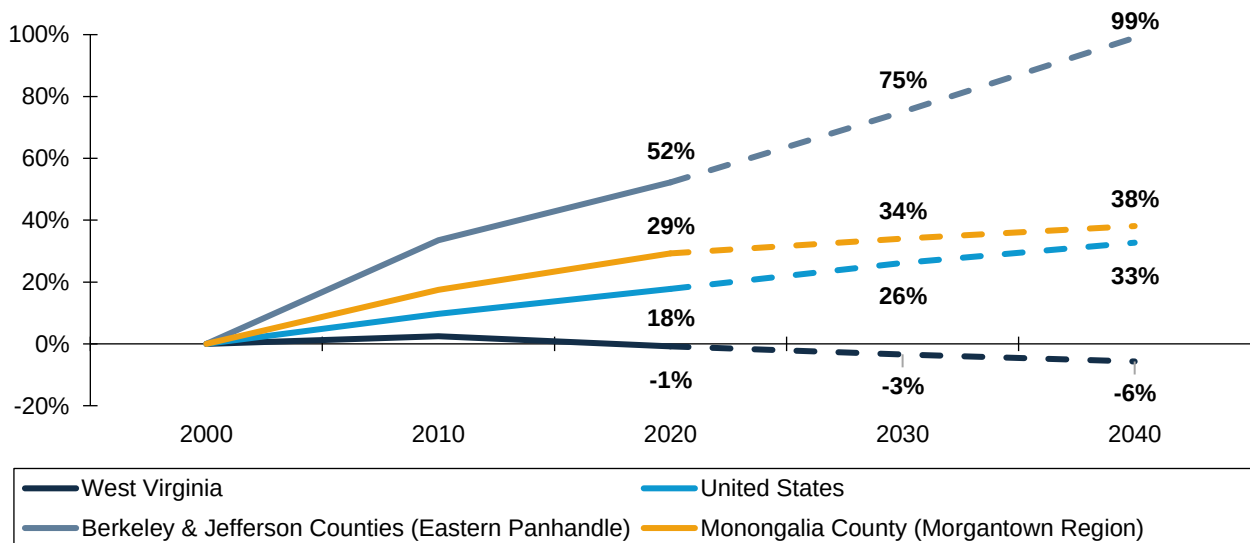
2.1.1 Demographic Trends

Population growth is one of the broadest measures of freight activity. Generally, a larger population will result in greater demand for goods. In 2020, West Virginia's population was approximately 1.79 million, making it the 12th least populous State in the U.S. West Virginia also is the third least urbanized State in the U.S., with more than half of residents residing outside of urbanized areas. In 2021, the West Virginia's workforce population was approximately 789,000, an approximately 3 percent decrease compared to 2015.¹³

The population growth of West Virginia (Figure 6) has trailed that of the U.S. as a whole. Between 2000 and 2020, West Virginia was the only State to lose population, recording a 1 percent drop in residents, compared to an 18 percent increase across the entire U.S. Through 2040, West Virginia's population figures are expected to follow a similar trajectory consisting of a slight loss of residents. These population losses are not uniformly distributed across the State; however, as key areas of the State will likely continue to see growth. This includes Monongalia County which is home to Morgantown, and Berkeley and Jefferson Counties which comprise the easternmost portion of the Eastern Panhandle. The Morgantown area is home to West Virginia University as well as a highly diversified and growing economy consisting of healthcare, education, and manufacturing clusters. The Eastern Panhandle is located within close proximity to the Baltimore and Washington, DC metropolitan areas, and also is traversed by I-81. Since 2000, both regions have grown at a faster rate than the U.S. as a whole. In the case of West Virginia's Eastern Panhandle, this rate of growth is expected to continue through 2040.

According to the Appalachian Regional Commission, out of the 55 counties in West Virginia, 18 are defined as economically distressed, and 15 are defined as at-risk (see Figure 7). To be classified as distressed, a county must rank in the bottom 10 percent of the Nation's counties on the basis of a national indexing of three key economic performance measures over a three-year period: unemployment rate, per capita market income, and poverty rate. At-risk counties are those that are on the threshold of becoming economically distressed, ranking between the worst 10 percent and 25 percent of the Nation's counties.

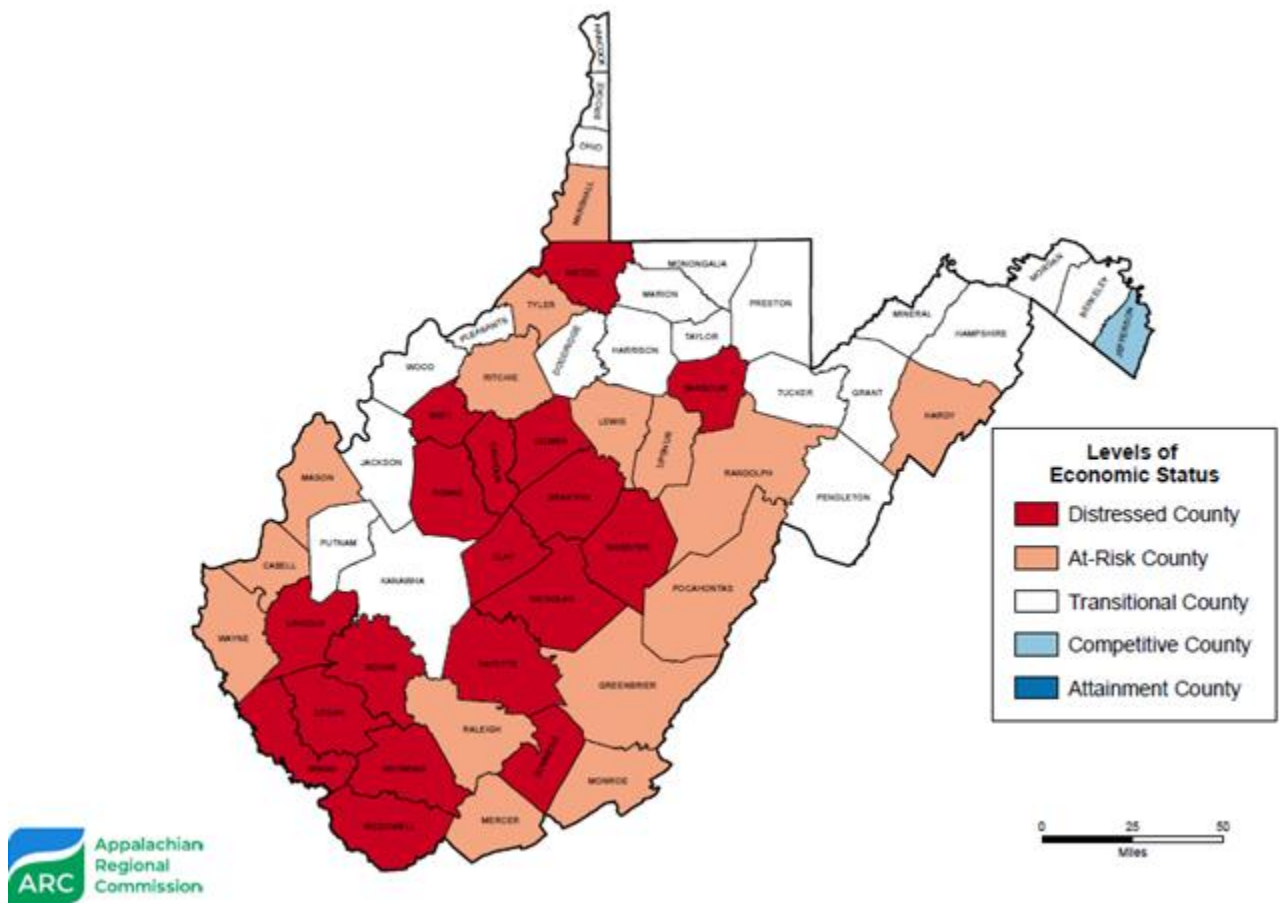
Figure 6. Historical and Projected Population Growth of Select Geographies, 2000–2040



Source: U.S. Census, West Virginia University John Chambers College of Business & Economics.

¹³ U.S. Census.

Figure 7. County Economic Status, 2023



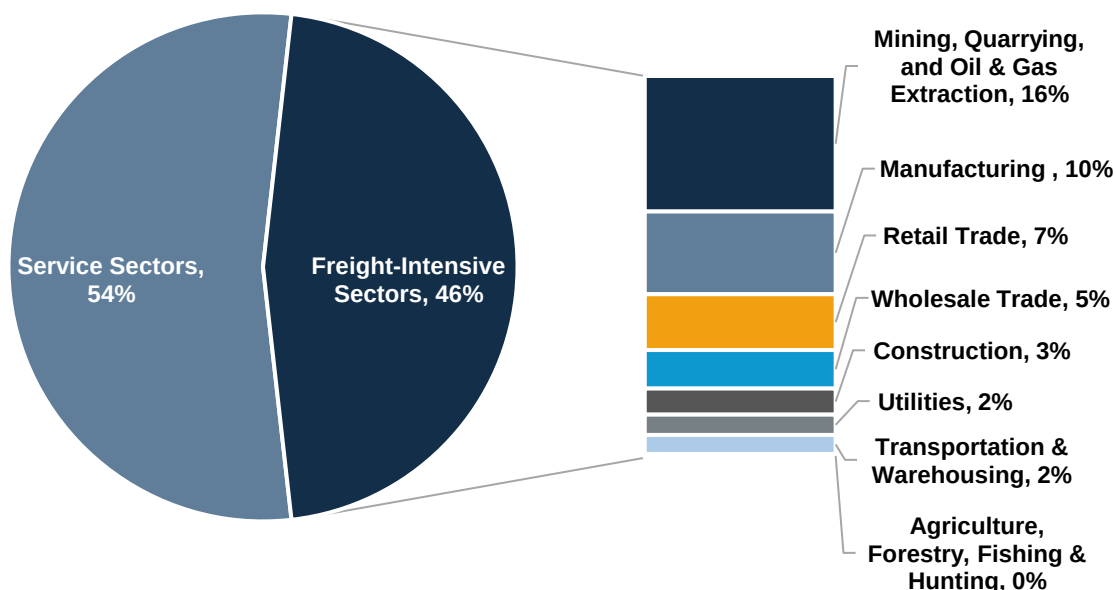
Note: There are distressed areas within transitional counties.

Source: Appalachian Regional Commission, 2023.

2.1.2 Economic and Industry Trends

West Virginia's economy historically has centered around coal, as well as the oil and gas industry. As shown in Figure 8, the mining industry remains the largest contributor to the West Virginia economy, comprising 16 percent of the State's \$71.3 billion in gross domestic product (GDP) in 2021. Overall, freight-intensive industries comprised 46 percent of the State's GDP in 2021. In addition to mining, key freight intensive industries include manufacturing (10 percent of total GDP), and retail trade (7 percent).

Figure 8. West Virginia Share of GDP by Industry, 2021

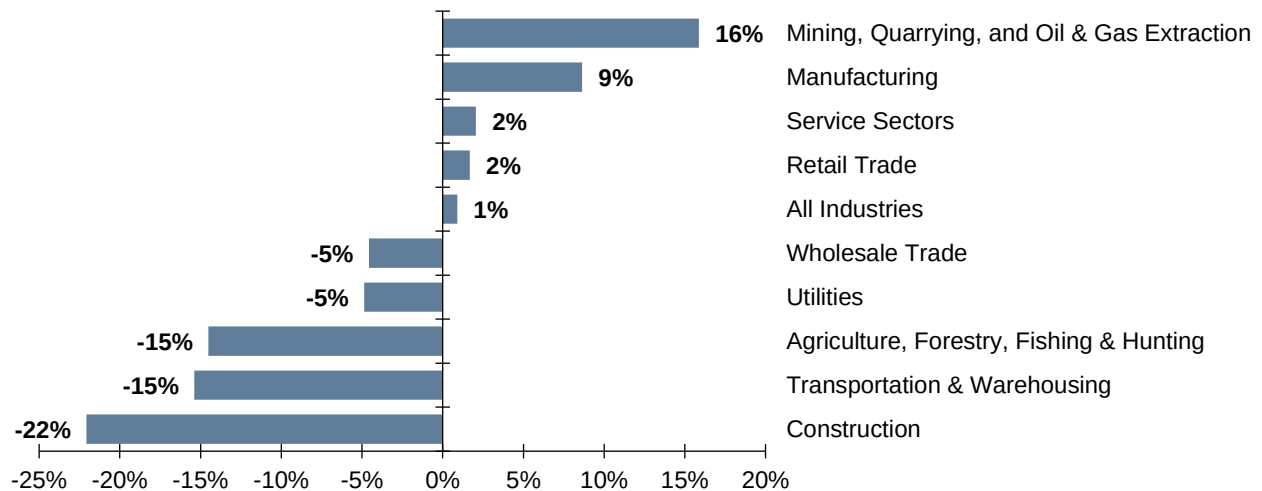


Note: Figures may not add up to 100 percent due to rounding.

Source: Bureau of Economic Analysis.

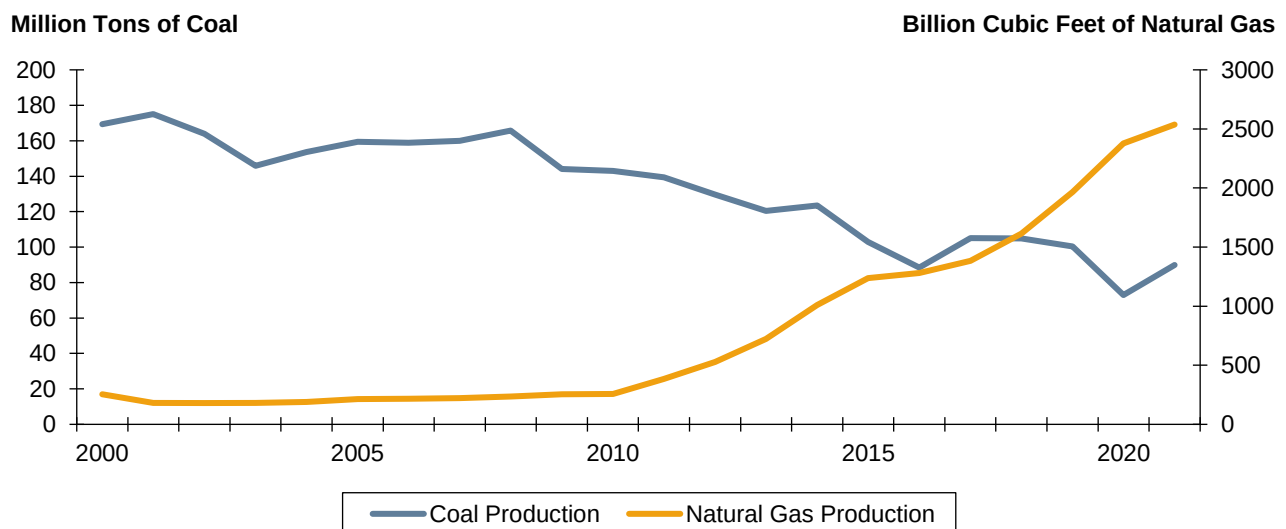
Since 2015, the magnitude of GDP growth across West Virginia's freight-intensive industries has varied, especially in comparison to that of all industries, as well as nonfreight-intensive service sectors (see Figure 9). The mining and manufacturing industries have both seen strong GDP growth between 2015 and 2021 of 16 percent and 9 percent respectively. Both sectors, which comprise nearly a quarter of West Virginia's GDP, have outpaced the growth of every other sector. On the other hand, the construction, agriculture/forestry, and transportation/warehousing industries have all contracted by over 15 percent since 2015.

The increases in GDP from mining have come at a pivotal time for the industry in West Virginia. Coal has been mined across the State since as early as 1810, with the industry expanding over time to include additional materials such as gravel and stone. Most prominently, West Virginia is known for its bituminous coal reserves which are the largest in the U.S. One of the four major types of coal (the others being anthracite, subbituminous, and lignite), bituminous coal is a high-quality form of coal used in the production of steel as well as for energy production, due to its high carbon and low moisture contents. The versatility of the State's coal reserves, abundance, and well-established history have made West Virginia the largest producer of bituminous coal, and second-largest producer of all types of coal in the U.S., trailing only Wyoming.

Figure 9. West Virginia GDP Growth by Industry (2015–2021)

Source: Bureau of Economic Analysis.

Despite the versatility of West Virginia's coal reserves, statewide coal production peaked in 1997 and has fallen significantly into the 2000s. The reasons behind this decline are complex and are attributed to multiple factors. This includes the exhausting of those mines with the highest quality and most accessible reserves, as well as an increase in environmental regulations which have affected the economic viability of coal production. Concurrent to this decline in coal production, technological advances and the branding of natural gas as a cleaner form of energy have led to a significant increase in natural gas production. Nearly all of West Virginia's geography lies within the Appalachian Basin Marcellus Shale which is among the largest sources of natural gas in the U.S. Since 2000, natural gas production in West Virginia has increased tenfold, while coal production has dropped by nearly half (Figure 10).

Figure 10. West Virginia Coal and Natural Gas Production by Year, 2000–2021

Source: West Virginia Office of Miners' Health Safety & Training, U.S. Energy Information Administration.

2.2 Key Freight Industries and Supply Chains

The freight transportation system is how West Virginia's most important exports are delivered to markets and consumers around the world. Freight movement is vital to the State and increases in freight transportation are directly related to increases in economic growth. Efficient freight transportation in West Virginia is essential for industry supply chains. Supply chains are networks between a company and its suppliers to produce and distribute products, and supply chains represent the steps to get products to end consumers. Understanding the concept of a supply chain provides a better grasp of freight transportation's impact on the West Virginia economy. In recent decades, efficient global freight systems have led supply chains to become highly complex and sophisticated, often sourcing inputs from a variety of countries and origins to minimize production costs and maximize profits.

The COVID-19 global pandemic exposed critical weaknesses in the supply chains for goods sourced and manufactured all over the world, resulting in ongoing supply chain disruptions, product shortages and sharp changes in how manufacturers, suppliers and retailers conduct business across the globe. It is critically important for WVDOT to support a resilient multimodal freight transportation system that addresses current and future freight and supply chain issues, as well as challenges associated with extreme weather and other natural hazards.

Freight movements are a derived activity based on the location of the sources of production for raw materials and intermediate goods and the consumption of those goods within an economy. Freight-generating industries in West Virginia include agriculture and forestry, mining, quarrying, oil and gas extraction, and manufacturing. Overall, freight-intensive industries comprised 46 percent of the State's GDP in 2021. The State is the second largest coal producer in the U.S. and the seventh largest for natural gas. West Virginia also is home to a large manufacturing industry, including metals, wood products, pharmaceuticals, and chemical compounds. Products manufactured in West Virginia range from base polymers in cosmetics to finished goods such as furniture. The majority of the top freight generators are located alongside major highways such as Interstates and alongside the Ohio River. Most industrial development growth in West Virginia is occurring along the geographic edges of the State. This includes strong demand in the Eastern Panhandle, as well as along the Ohio River. Morgantown also remains a growth area across multiple sectors, including energy, tech, education, and health. In-demand industrial and commercial sites include those with rail and barge access, as well as in proximity to airports.

The reliability of the freight transportation network is critical when planning raw material sources and the distribution of finished products. Unexpected delays can result in slowing or halted manufacturing processes and decreasing productivity, which increases manufacturing costs and prices for the end consumer. To enhance future economic growth, West Virginia must invest and implement strategies to support the increasing demand for a safe and reliable multimodal transportation infrastructure.

2.2.1 Industry Spotlights

The following strategic supply chains were identified as key freight-intensive export industries in the State: agriculture and food processing; forestry, metals, and building products; energy; chemicals and polymers; automotive; aerospace; and warehousing and distribution and ecommerce. These industries are described in more detail below. In 2019, these industries combined accounted for an estimated 319 million tons and over \$115 billion worth of freight moving into, out of and within West Virginia. The energy, and the forestry, metals, and building products sectors had the highest tonnage, and the aerospace, automotive, chemicals and polymers, and energy sectors had the highest value.

FOOD & AGRICULTURE

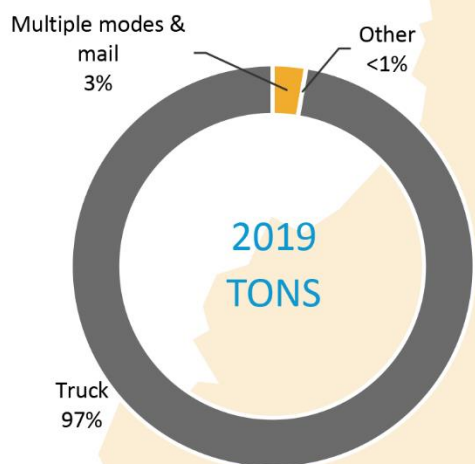


West Virginia's state's farmers produced \$800 million in agriculture products in 2022.¹ The highest valued commodities are cattle and calves, broilers, and turkeys.² In 2021, the value of West Virginia's agricultural production and processing industries represented 1.7 percent of the total state GDP.



Source: Ag Business: West Virginia Department of Agriculture (wv.gov)

MODAL SPLIT³



AT A GLANCE



\$703.7M
Industry GDP
(2021)⁵



2019 Freight Flows³
4.7M tons
\$5.6B in value

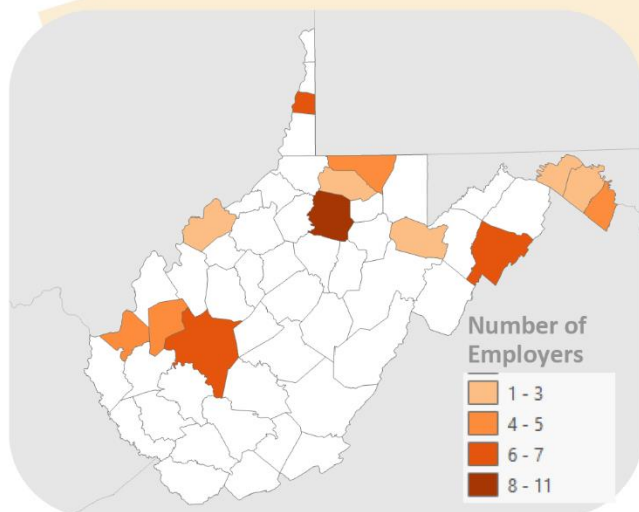


0.82%
West Virginia
GDP⁵

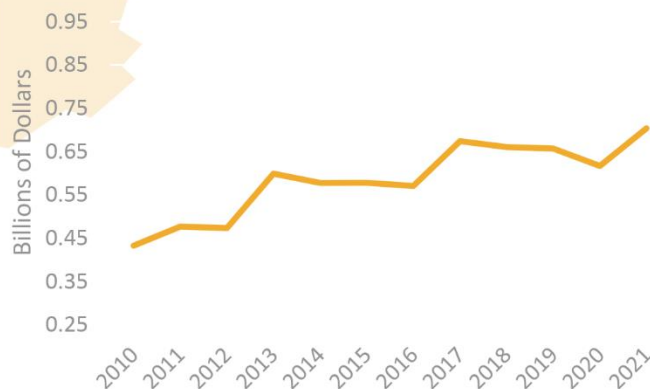


2050 Future Flows³
8.7M tons ↑86%
\$11.3B ↑98%

EMPLOYERS⁴



ANNUAL PRODUCTION⁵



Sources:

¹ Food and Agriculture | West Virginia Department of Economic Development Website | ² <https://economic-impact-of-ag.uada.edu/west-virginia/> | ³ FHWA FAF v5.4.1 (2019-2050). These freight volumes are estimates and include total volumes for Standard Classification of Transported Goods (SCTG) Codes 01-08 |

⁴ U.S. Census County Business Patterns (CBP) (2021) NAICS 111, 112, 114, 1151, 1152, 311, 3121 | ⁵ U.S. Department of Commerce Bureau of Economic Analysis (2023)

BUILDING PRODUCTS

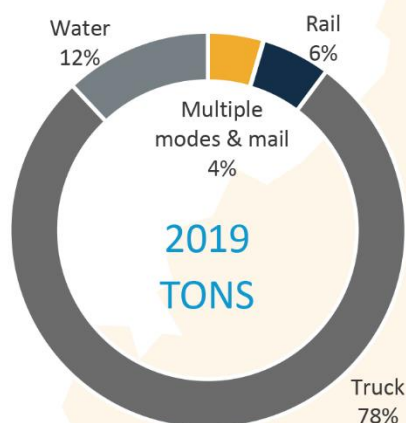


West Virginia is the third most forested state in the nation (11.9 million forested acres).¹ The abundant wood products make West Virginia a leading producer of hardwoods. The state also has abundant resources such as coal and limestone for making steel and cement. Additionally, a highly skilled workforce and robust training facilities support future growth.



Source: Huntington Steel

MODAL SPLIT²



AT A GLANCE



\$2.3B
Industry GDP
(2021)⁴



2019 Freight Flows²
57.6M tons
\$13.8B

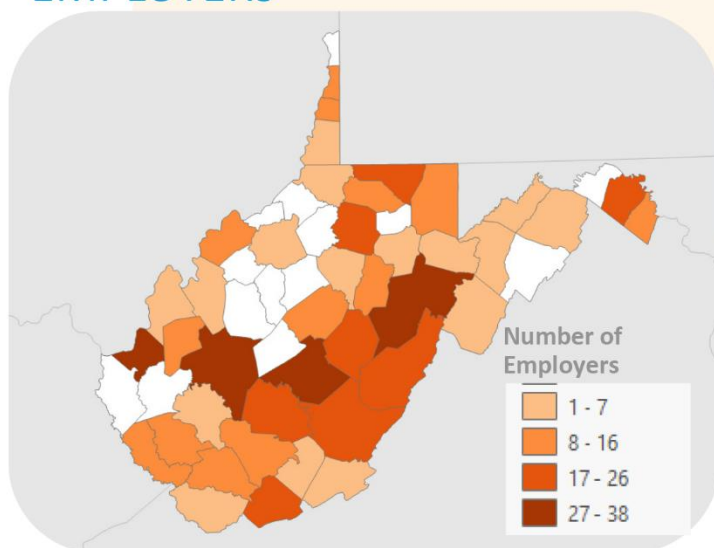


2.75%
West Virginia
GDP⁴



2050 Future Flows²
80.3M tons ↑ 39%
\$19.6B ↑ 43%

EMPLOYERS³



ANNUAL PRODUCTION⁴



Sources:

¹ Building Products | West Virginia Department of Economic Development Website | ² FHWA FAF v5.4.1 (2019-2050). These freight volumes are estimates and include total volumes for Standard Classification of Transported Goods (SCTG) Codes 10-12, 25, 26, 31, 32, 33 | ³ U.S. Census County Business Patterns (CBP) (2021) NAICS 113, 2123, 321, 3273, 3279, 331, 332 | ⁴ U.S. Department of Commerce Bureau of Economic Analysis (2023)

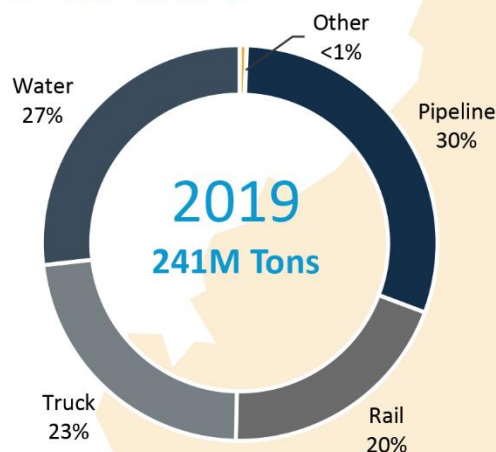


West Virginia ranked fourth in the U.S. for total energy production in 2020, producing 5 percent of the nation's total.¹ The state is the second largest coal producer in the U.S. and the seventh largest for natural gas.² Many natural gas processing plants and pipelines have been constructed or expanded in north-central West Virginia. Pipelines transport natural gas liquids from Appalachia to the Texas Gulf Coast, and to eastern refineries.³



Source: West Virginia Coal Mining | Delta Whiskey | Flickr

MODAL SPLIT⁴



AT A GLANCE



\$12.99B
Industry GDP
(2021)⁶



2019 Freight Flows⁴
241.4M tons
\$36.1B

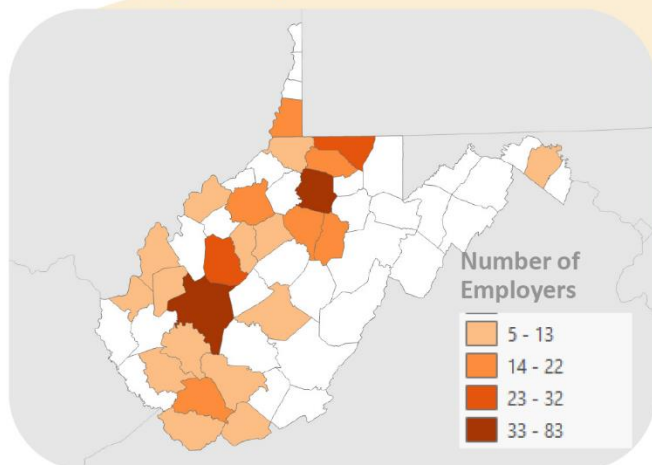


15.21%
West Virginia
GDP⁶

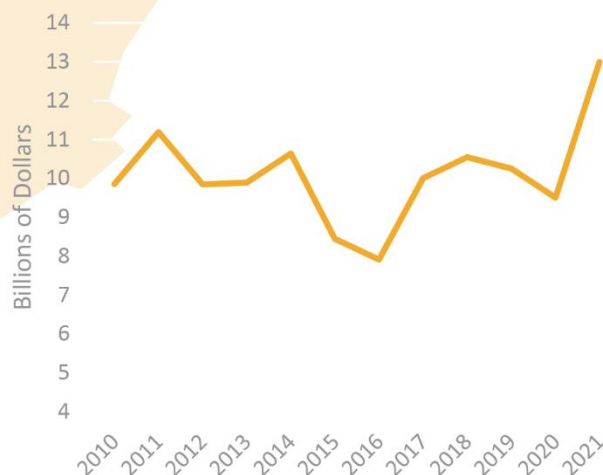


2050 Future Flows⁴
148.4M tons ↓ 39%
\$32.2B ↓ 11%

EMPLOYERS⁵



ANNUAL PRODUCTION⁶



Sources:

¹ U.S. Energy Information Administration - EIA - Independent Statistics and Analysis | ² Energy | West Virginia Department of Economic Development Website | ³ WV Office of Energy | ⁴ FHWA FAF v5.4.1 (2019-2050). These freight volumes are estimates and include total volumes for Standard Classification of Transported Goods (SCTG) Codes 15-19 | ⁵ U.S. Census County Business Patterns (CBP) (2021) NAICS 211, 2121, 213111, 213112, 213113, 2211, 2212, 324, 486 | ⁶ U.S. Department of Commerce Bureau of Economic Analysis (2023)

CHEMICAL & POLYMER

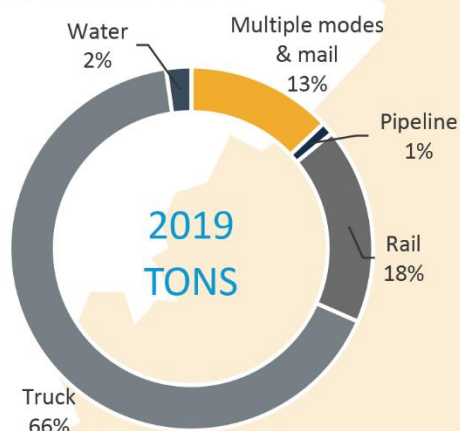


West Virginia has a long history as a pioneer and leader in the chemical industry. Located within the Appalachia Basin, which produces essential feedstock for the chemical and polymer industries, has made the State a desirable location for these companies. The state has a large base of specialty chemical companies, many of which have specialized facilities and infrastructure. Active chemical industrial parks offer access to shared services and colocation at sites with infrastructure and existing permits.¹



Source: Home - Skunkworx Bio, Inc. (skwxbio.com)

MODAL SPLIT²



AT A GLANCE



\$3.48B
Industry GDP
(2021)⁴



2019 Freight Flows²
9.6M tons
\$26.9B

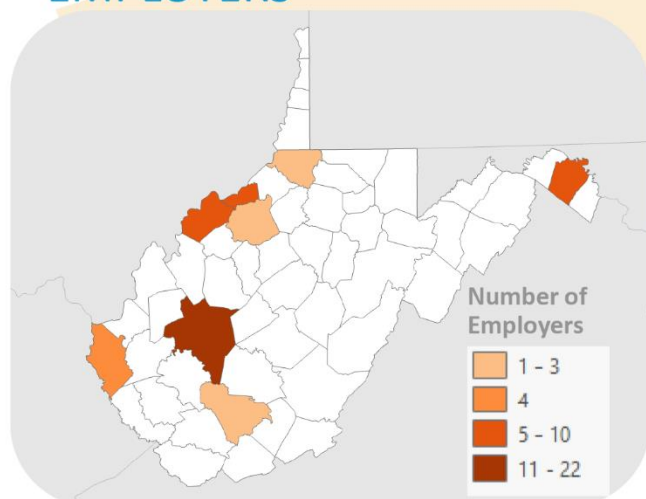


4.08%
West Virginia
GDP⁴

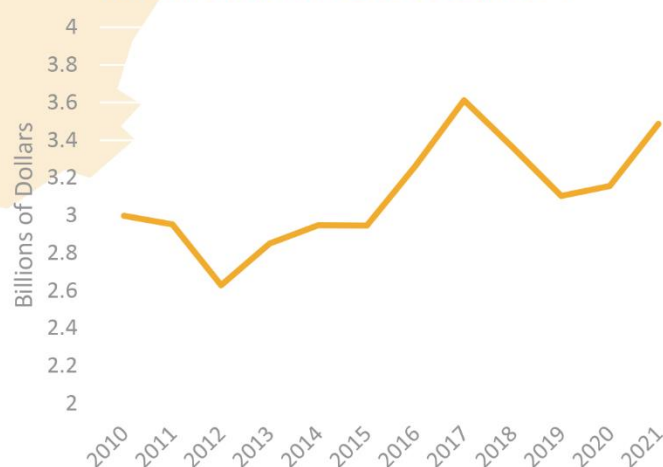


2050 Future Flows²
26.7M tons ↑ 178%
\$78.1B ↑ 189%

EMPLOYERS³



ANNUAL PRODUCTION⁴



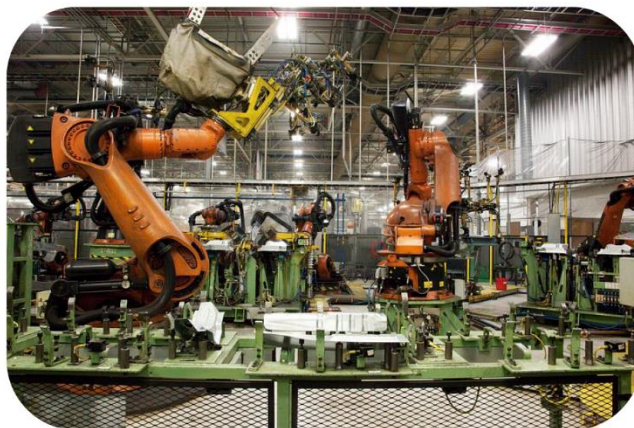
Sources:

¹ Chemical/Polymer | West Virginia Department of Economic Development Website | ² FHWA FAF v5.4.1 (2019-2050). These freight volumes are estimates and include total volumes for Standard Classification of Transported Goods (SCTG) Codes 20-24 | ³ U.S. Census County Business Patterns (CBP) (2021) NAICS 325, 3261 | ⁴ U.S. Department of Commerce Bureau of Economic Analysis (2023)

AUTOMOTIVE

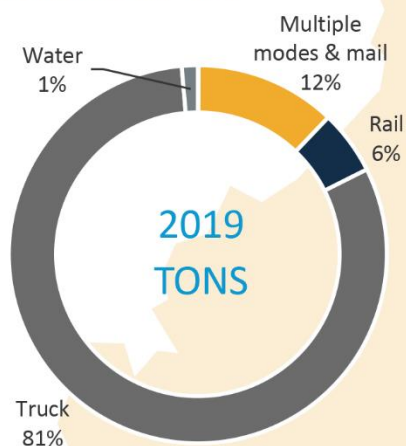


West Virginia produces a wide range of automotive components including engines, transmissions, thermostats, pumps, and seats. The state provides convenient access to raw materials including steel, aluminum, chemicals, and polymers, and is near assembly plants in the U.S. and Canada. This industry has grown from a handful of companies in the mid-90's to now over two dozen automotive assembly and component producers.¹



Source: Free Vectors, PNGs, Mockups & Backgrounds - rawpixel

MODAL SPLIT²



AT A GLANCE



\$840.5M
Industry GDP
(2021)⁴



2019 Freight Flows²
8.5M tons
\$32.8B

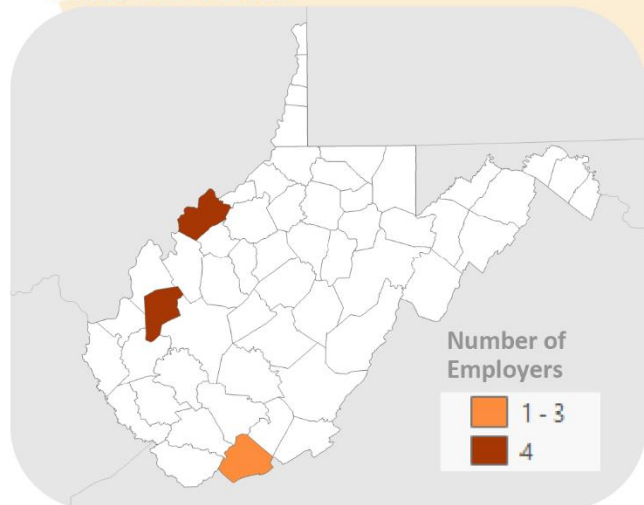


0.98%
West Virginia
GDP⁴

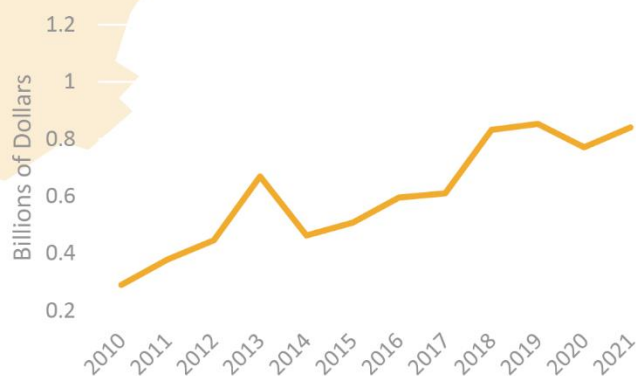


2050 Future Flows²
12.1M tons ↑ 41%
\$55.1M ↑ 68%

EMPLOYERS³



ANNUAL PRODUCTION⁴



Sources:

¹ Automotive | West Virginia Department of Economic Development Website | ² FHWA FAF v5.4.1 (2019-2050). These freight volumes are estimates and include total volumes for Standard Classification of Transported Goods (SCTG) Codes 32-36, 38 | ³ U.S. Census County Business Patterns (CBP) (2021) NAICS 3262, 3362, 3363 | ⁴ U.S. Department of Commerce Bureau of Economic Analysis (2023)

AEROSPACE

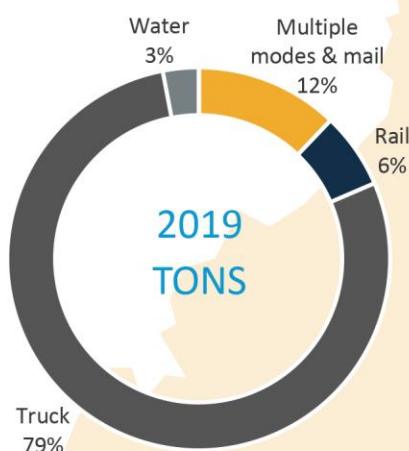


The aerospace industry is an emerging industry that is rapidly growing in the state. West Virginia manufacturers provide the aerospace industry access to raw materials such as aluminum, alloys, metals and composites. The state is also in close proximity to equipment manufacturers, purchasing sectors, national defense contractors, and federal agencies. ¹



Source: Key parts of moon mission manufactured in W.Va. - WV MetroNews

MODAL SPLIT²



AT A GLANCE



\$194.5M
Industry GDP
(2021)⁴



2019 Freight Flows²
9.2M tons
\$28.4B

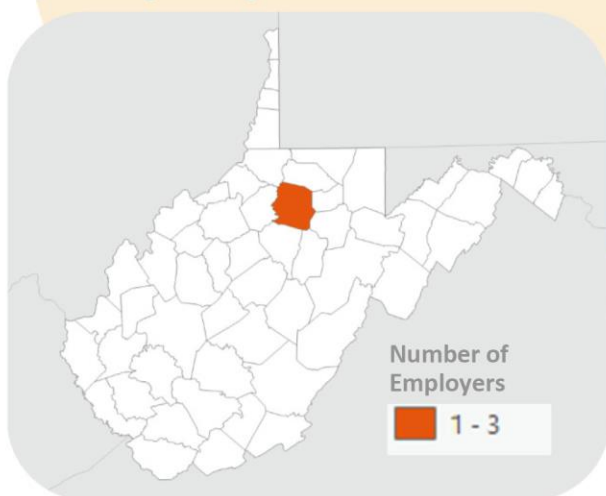


0.23%
West Virginia
GDP⁴

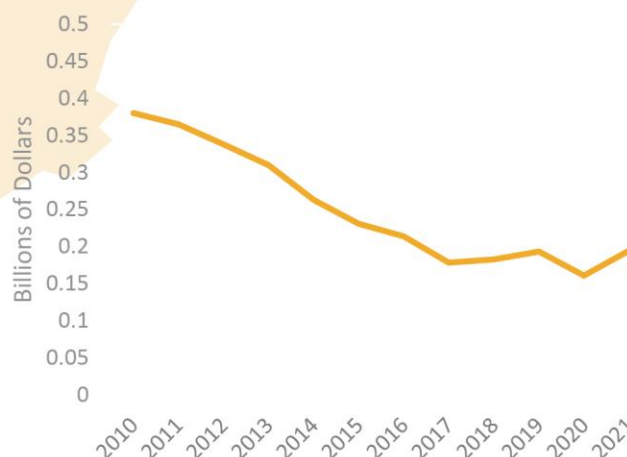


2050 Future Flows²
12.7M tons ↑ 38%
\$48.1B ↑ 69%

EMPLOYERS³



ANNUAL PRODUCTION⁴



Sources:

¹ Aerospace | West Virginia Department of Economic Development Website | ² FHWA FAF v5.4.1 (2019-2050). These freight volumes are estimates and include total volumes for Standard Classification of Transported Goods (SCTG) Codes 32-35, 37, 38 | ³ U.S. Census County Business Patterns (CBP) (2021) NAICS 3364 |

⁴ U.S. Department of Commerce Bureau of Economic Analysis (2023)

WH/DC & eCOMMERCE



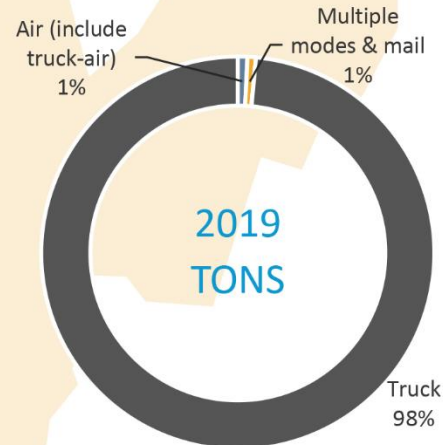
The retail sector has changed tremendously during the past few decades. Ecommerce dramatically changed the traditional “brick and mortar” retail market as customers grew to rely on its convenience and cost-effectiveness. In 2020, the COVID-19 pandemic created an unprecedented and immediate jump in ecommerce demand, as consumers avoided in-person shopping to adhere to social distancing and work-from-home protocols.

Ecommerce is now estimated to comprise 15.1% of total U.S. retail sales, an increase of 53% over its retail share in 2018. The industry's total value reached \$1 trillion in 2022.¹ Rising ecommerce volumes are resulting in “mega-warehouse” developments of one million square feet or more. Because of the State’s topography, large industrial sites like these are being developed for warehousing and distribution centers (WH/DC) in the Eastern Panhandle.

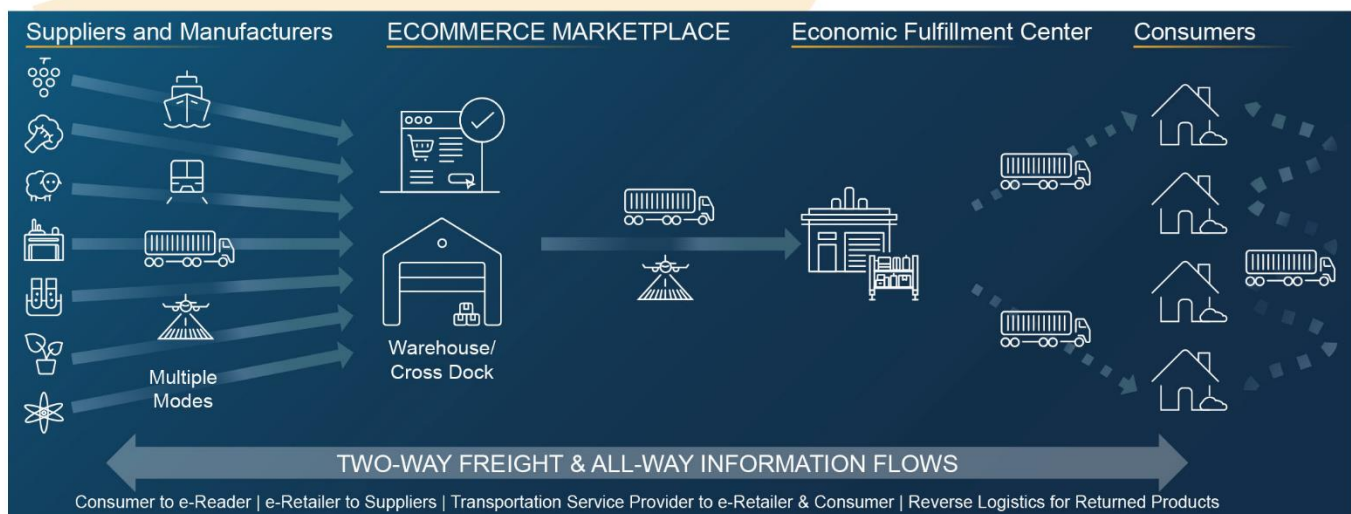


Source: OSHA Region 3 Launches Warehouse Emphasis Program - EHS Daily Advisor (blr.com)

MODAL SPLIT²



ECOMMERCE RETAIL SUPPLY CHAIN



Sources:

¹ U.S. Census Quarterly Retail Ecommerce Sales Q1 2023 | ² FHWA FAF v5.4.1 (2019-2050). These freight volumes are estimates and include total volumes for Standard Classification of Transported Goods (SCTG) Code 43

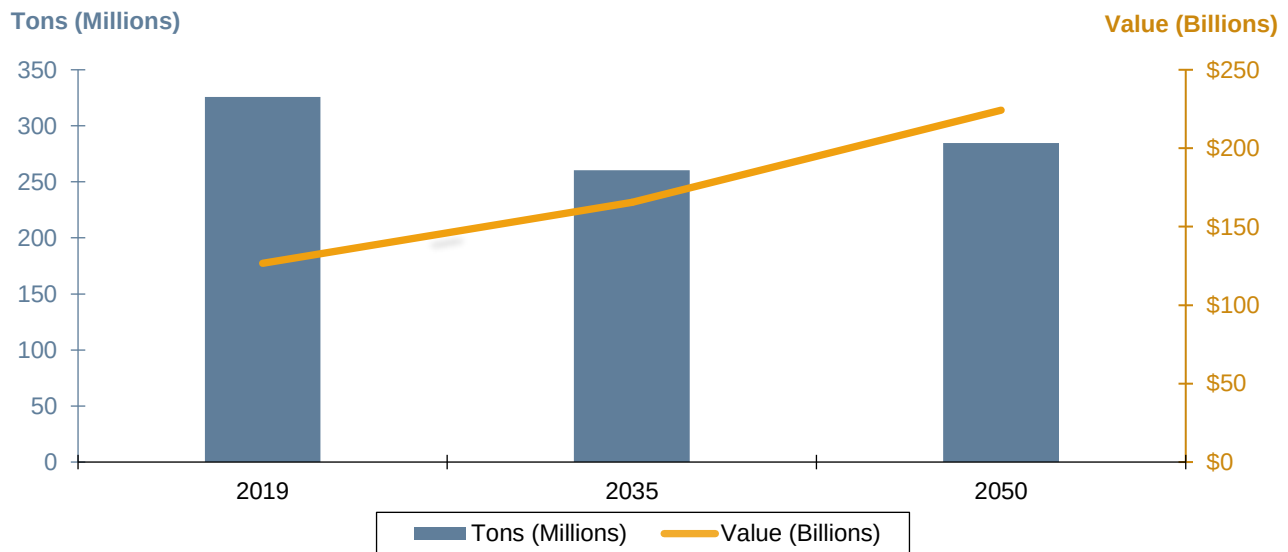
2.3 Freight Activity and Forecasts

As discussed in Section 2.1, the multimodal freight transportation network has direct ties to West Virginia's prosperity, and is closely linked to the State's economic activity and quality of life. A productive and connected freight network is necessary to support both the businesses and residents of West Virginia—now and in the future. A key component of this Freight Plan is understanding current and future freight demand for West Virginia through a commodity flow analysis. The outcomes of this analysis, presented in this section, will inform multimodal freight network investment needs presented in Section 4.0. A full analysis of statewide commodity flows is available in the *Commodity Flow Profile* produced as part of this 2023 State Freight Plan.

2.3.1 Current and Future Freight Flows

In 2019, 326 million tons of freight, valued at \$127 billion was transported to, from, and within West Virginia's network of highways, railways, waterways, airports, and pipelines.¹⁴ As seen in Figure 11, by 2050, the total tonnage transported is projected to decrease slightly to 285 million tons (a 12.7 percent decrease from 2019 tonnage), driven by an anticipated continued decline in the quantities of coal. The total value of goods moved, however, is projected to increase to \$224 billion (a 76.4 percent increase from 2019 value), as high-value products such as pharmaceuticals and machinery are expected to comprise larger shares of the volume of goods moved. Takeaways from the freight flow forecasts through 2050 are highlighted in Figure 12.

Figure 11. West Virginia Total Freight Flows by Tonnage and Value, 2019–2050



Source: FHWA's Freight Analysis Framework version 5.4.1 (FAF5), disaggregated by Cambridge Systematics, Inc. 2023.

¹⁴ FHWA's FAF5 data, which does not include West Virginia passthrough commodity flows.

Figure 12. Key Takeaways from West Virginia Commodity Flow Analysis

Key takeaways from West Virginia's commodity flow analysis projections:

The rise in higher per-unit-price commodities such as pharmaceuticals, precision instruments, and electronics is anticipated to drive the increase in overall freight value.

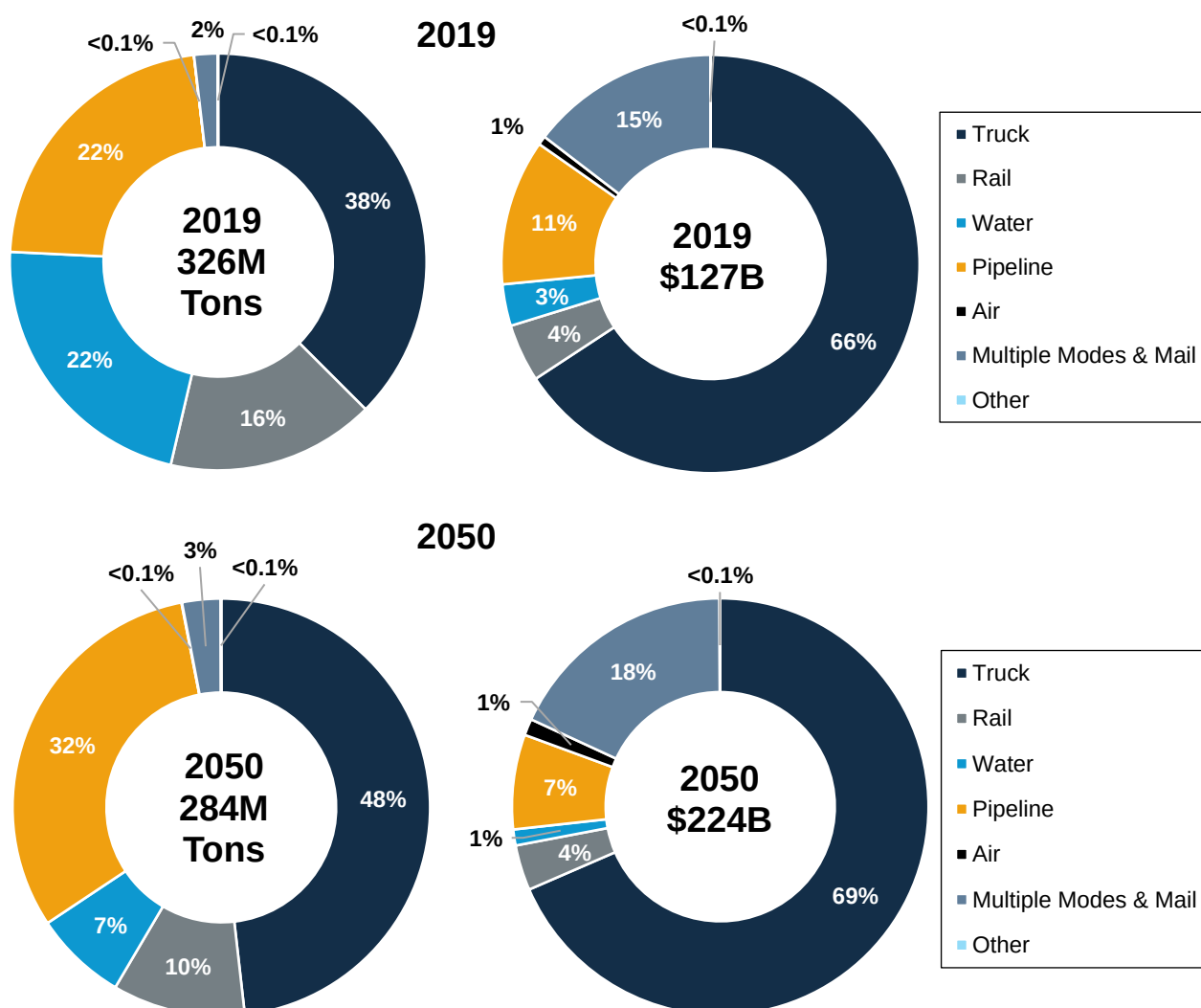
From 2019 to 2050, the entire freight system is projected to carry less tonnage yet higher values. Tonnage is expected to decline by 42 million tons, but increase in value by \$97 billion.

The most common mode of transportation for coal, the rail network, is projected to be the mode most affected by the decline in coal.

As illustrated in Figure 13, the majority of West Virginia's goods are moved on highways. In 2019, truck-based freight accounted for the largest modal share by tonnage (38 percent), and the highest value (66 percent). Unique to West Virginia, pipeline is the second-largest freight mode by tonnage, and third in value, distributing high quantities of energy products.

Water (ports and waterways) falls closely behind pipeline in tonnage, followed by rail, multiple modes and mail, and air, respectively. Multiple modes and mail are the second-most valuable mode in 2019, accounting for 15 percent of total value despite accounting for only 2 percent of all tonnage. This mode is expected to increase in prevalence, accounting for more than \$40 billion or 18 percent of the value by 2050. Similarly, by 2050, truck and pipeline are projected to move the majority of tonnage at 80 percent, with an estimated share of 76 percent of total value. Overall, the four largest movers of freight (truck, pipeline, water, and rail) carry between 97–98 percent of all tonnage in 2019, which will continue into 2050.

Figure 13. Freight Tonnage and Value by Mode, 2019–2050



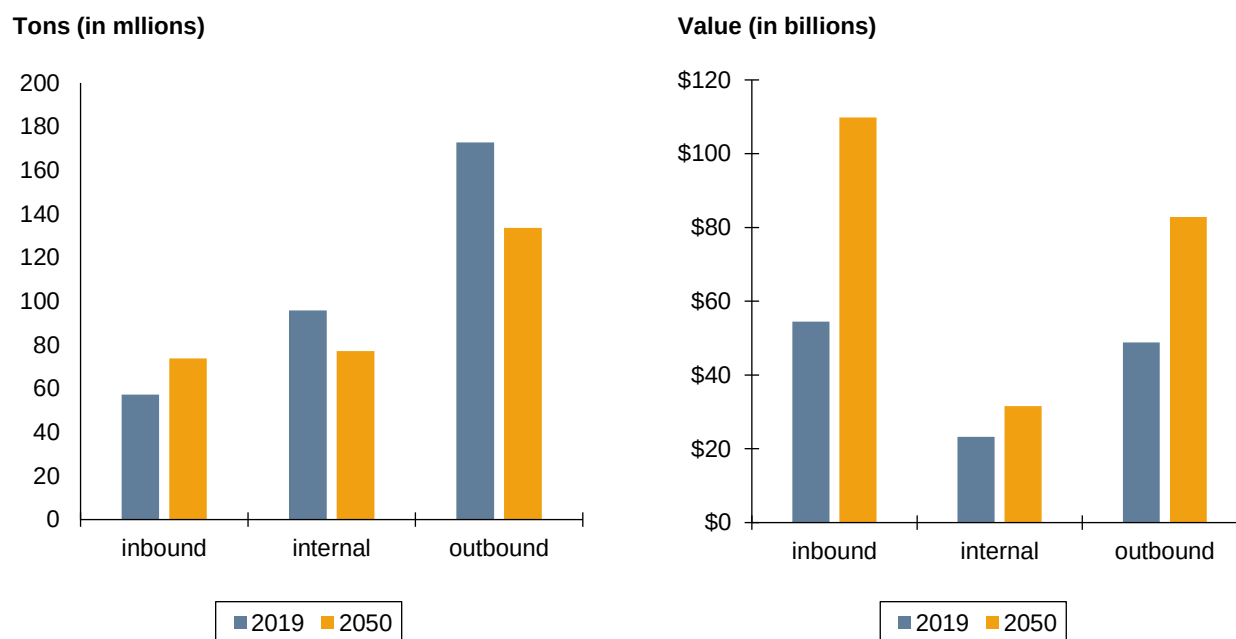
Source: FHWA's FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

Figure 14 shows the current and future projections of freight tonnage and value by direction. In 2019, outbound traffic made up the largest share of freight in West Virginia by tonnage. Nearly 53 percent of total tonnage (173 million tons) was outbound, valued at approximately \$50 billion. The largest share of freight value in West Virginia was inbound, slightly surpassing the value of outbound at \$54.5 billion. While the value of inbound and outbound freight is balanced, tonnage is less balanced given the concentration of the coal industry. Internal flows (origin and destination within West Virginia) shape tonnage patterns due to the short hauls needed for the mining, quarrying, and oil and gas extraction industries, and in particular coal movements. Internal flows are the second-largest share of freight by tonnage.

Inbound traffic to West Virginia is the only directional split that is projected to have a tonnage increase from 2019 to 2050. By 2050, 26 percent of total tonnage is estimated to travel inbound, totaling almost half of total freight value. Outbound and internal tonnage are forecasted to decrease due to the projected contraction of

the coal industry. By value, all directional flows are projected to increase, mostly driven by growth in high-value commodities such as pharmaceuticals, plastics and rubber, and basic chemicals.

Figure 14. Future Tonnage (Left) and Value (Right) Projections by Direction, 2019–2050



Source: FHWA's FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

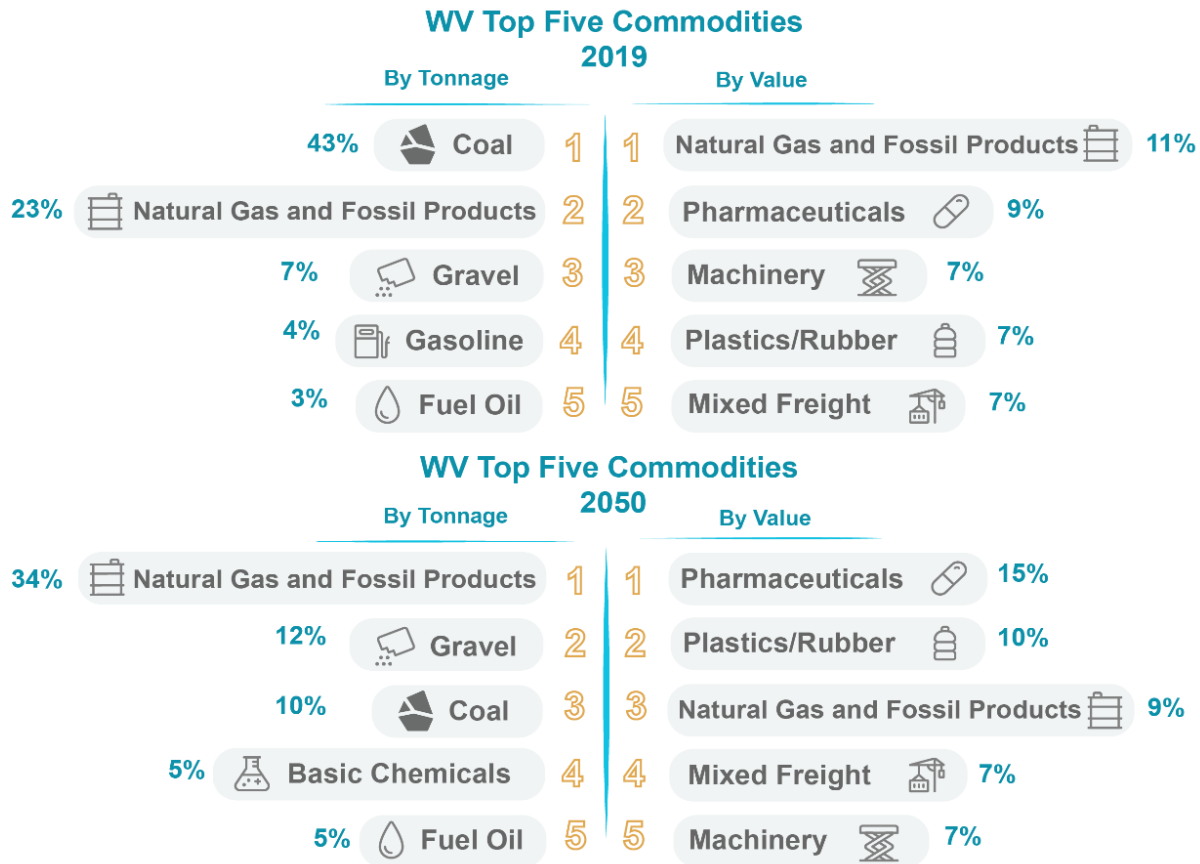
2.3.2 Top Commodities

West Virginia is one of the Nation's major energy producers. In 2021, West Virginia was ranked as the second-largest coal producer in the U.S., and it produced 14 percent of the Nation's total coal production.¹⁵ The top commodities by tonnage and value in West Virginia are shown in Figure 15.

In 2019, coal was the largest commodity transported to, from, and within West Virginia. Approximately 140 million tons of coal, valued at \$8 billion were transported in all directions. However, with the gradual decline of the industry, by 2050, the tonnage and value of coal are projected to substantially decline (81 percent and 34 percent, respectively). In 2019, natural gas and fossil products were the second-largest commodity in terms of tonnage (74 million tons) and was the top commodity by value, at \$14 billion. By 2050, these products are projected to become the largest commodity type in terms of tonnage. Pharmaceutical products and machinery were the second- and third-largest commodity groups by value moved in 2019. By 2050, pharmaceuticals and plastics/rubber are expected to overtake energy products to become the top two commodities by value.

¹⁵ <https://www.eia.gov/state/print.php?sid=WV>.

Figure 15. Top Commodities by Tonnage and Value, 2019–2050



Source: FHWA's FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

2.3.3 Domestic Trading Partners

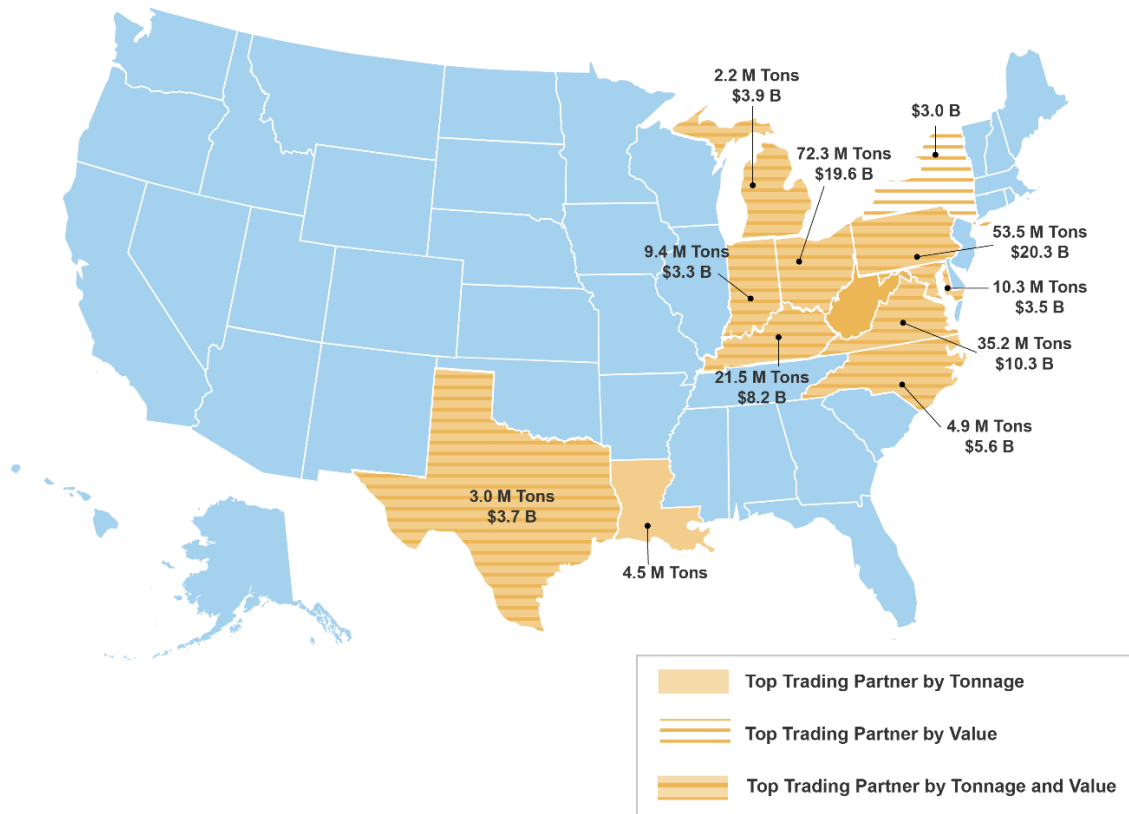
In 2019, the top 10 West Virginia inbound and outbound domestic trading partners (as shown in Figure 16) accounted for more than 94 percent (217 million tons) of total inbound and outbound tonnage and 79 percent (\$81 billion) of total inbound and outbound freight value. By 2050, the trade with these States is projected to account for 91 percent (188 million tons) of the total traded tonnage, and 76 percent (\$147 billion) of total traded value.

West Virginia ships and receives goods from across the Nation, with a particularly high concentration of freight trade with its nearest neighbors. Pennsylvania, Ohio, and Virginia are the three top trading partners in terms of tonnage and value. With 50 percent of total inbound tonnage and 47 percent of total inbound value, and 77 percent of total outbound tonnage and 50 percent of total outbound value. These States are projected to continue to be West Virginia's top trading partners through 2050.

The majority of inbound and outbound tonnage includes energy products, chemicals, pharmaceuticals, plastics and rubber. The inbound tonnage of plastics and rubber is estimated to surge between 2019 and 2050. In 2019, plastics/rubber ranked 11th of the inbound commodities (1 million tons), but is projected to become the fifth-largest inbound commodity by 2050. Notably by 2050, Texas is projected to move its way into the top five domestic partners for tonnage, replacing Maryland. Texas will reach 36 percent of all

inbound and outbound tonnage, trading chemicals, pharmaceuticals, plastics and rubber, and energy products. The majority of inbound and outbound freight value also is derived from energy products, chemicals, pharmaceuticals, and plastics and rubber, but also includes mixed freight, machinery and precision instruments, and agricultural products.

Figure 16. Top 10 Domestic Trading Partners by Value and Tonnage, 2019



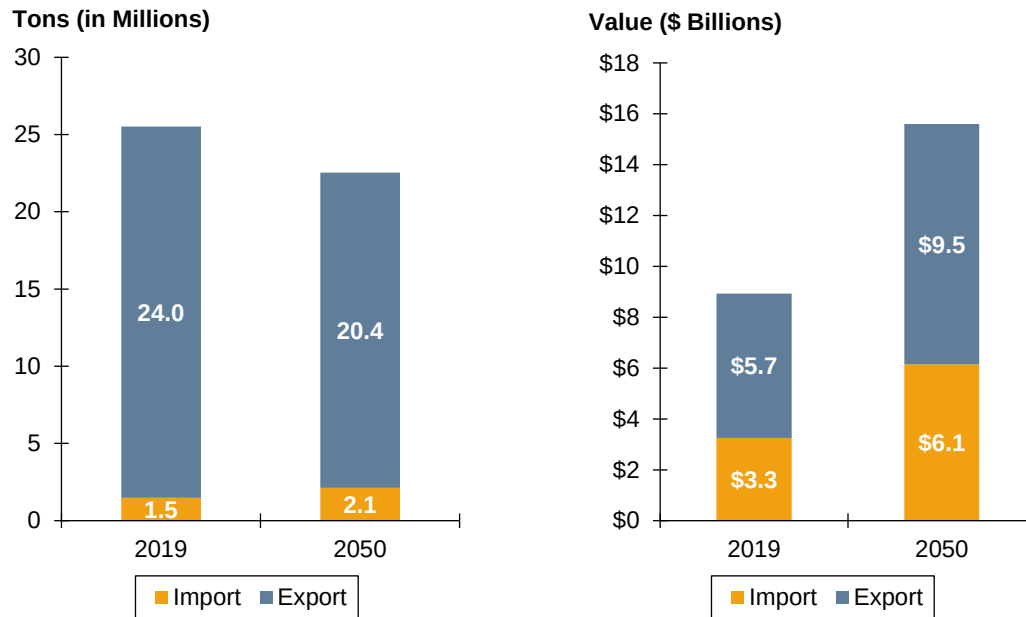
Source: FHWA's FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

2.3.4 International Trading Partners

In 2019, 26 million tons of goods, valued at \$9 billion were traded internationally as imports to, or exports from, West Virginia. By 2050, that number is expected to slightly decline to 23 million tons, but rise in value to \$16 billion. The details of the 2019–2050 projections for West Virginia's imports and exports are shown in Figure 17. Commodities imported to West Virginia from outside the United States include nonmetallic minerals, basic chemicals, base metals, machinery, natural gas and fossil products, and motorized vehicles. West Virginia's international exports mostly consist of coal, plastics and rubber, machinery, base metals, and basic chemicals.

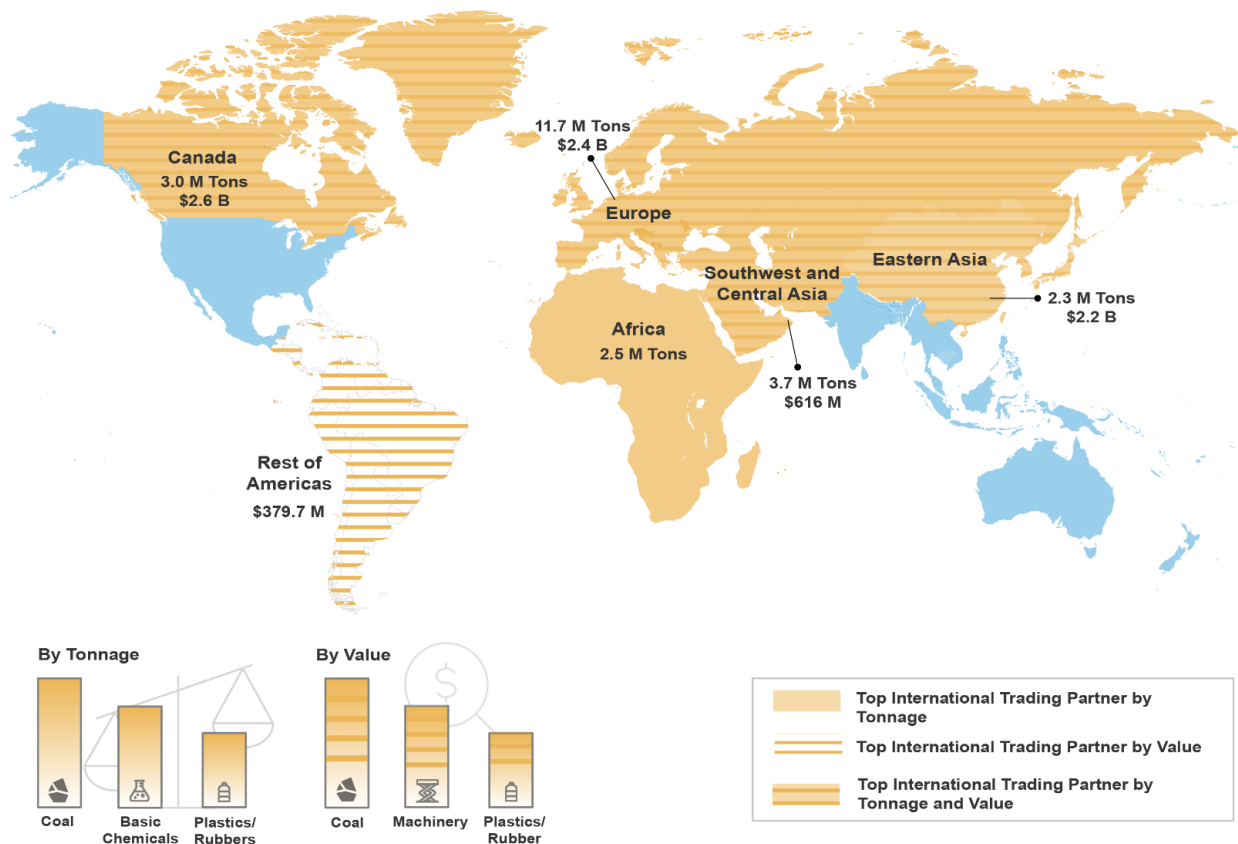
Figure 18 shows the top five international trading partner regions by value and tonnage, as well as the top three commodities traded, for 2019. In total, the top five trading regions accounted for 91 percent of all tonnage and 90 percent of total value in 2019. Canada is, and is projected to remain, the highest value trading partner in 2019 and 2050. Europe is, and projected to continue to be trading the most tonnage in 2019 and 2050.

Figure 17. International Imports and Exports by Tonnage (Left) and Value (Right), 2019–2050



Source: FHWA's FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

Figure 18. Top 5 International Trading Partners and Commodities by Value and Tonnage, 2019



Source: FHWA's FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

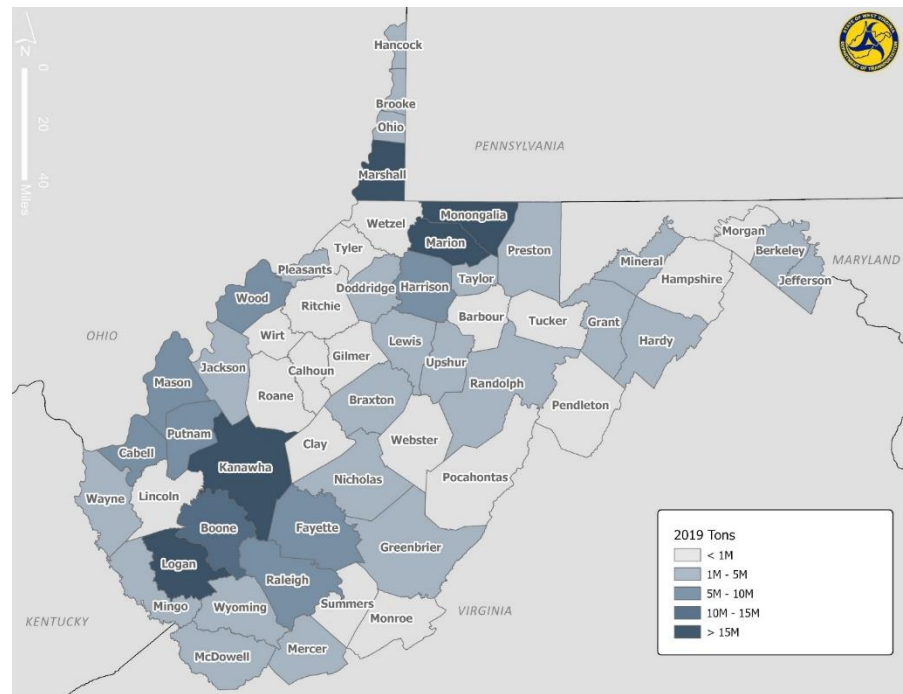
2.3.5 West Virginia County-Level Freight Generation

While freight movement is critical to economies across all of West Virginia, the distribution of freight activity and freight value is highly variable by county as shown in Figure 19 and Figure 20. Counties with high concentrations of industries and resources and access to the freight transportation network (including Interstate highways) show more freight activity.

In 2019, Kanawha, Marion, Marshall, Logan, and Monongalia were the top counties in terms of freight tonnage accounting for 43 percent (98 million tons) of the State's inbound and outbound tonnage. By 2050, the State's combined inbound and outbound tonnage generated by these counties is projected to decline by 28 percent to 70 million tons.

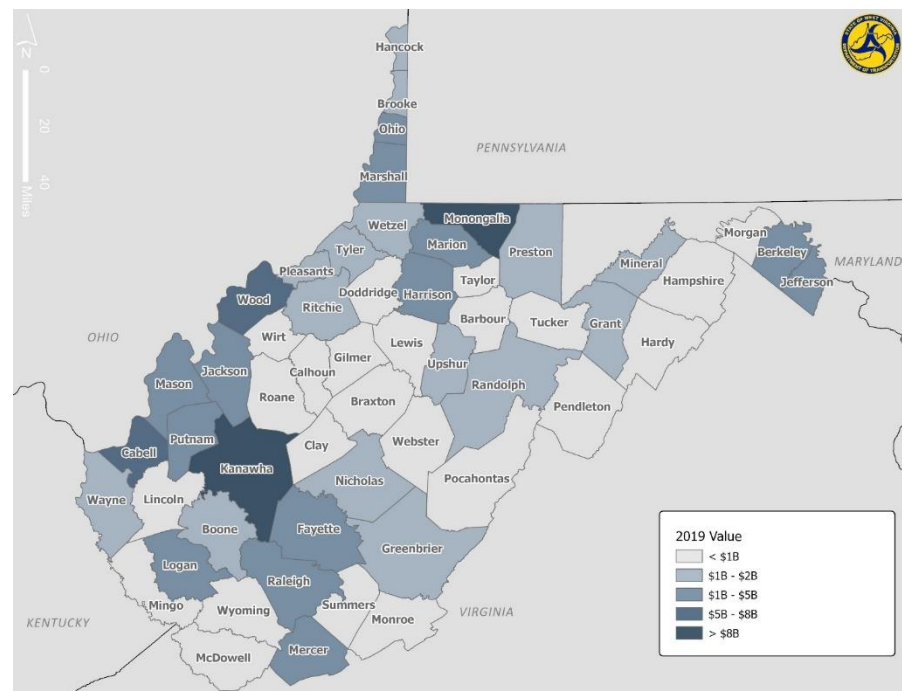
When measured by freight value Kanawha, Monongalia, Cabell, Wood, and Berkeley were the leading counties in 2019, and projected to be the lead in 2050. In 2019 these counties accounted for 37 percent (\$38 billion) of the State's inbound and outbound freight value. By 2050, the State's combined inbound and outbound freight value generated by these counties is projected to more than double to \$77 billion.

Figure 19. WV Counties by Inbound and Outbound Tonnage, 2019



Source: FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

Figure 20. WV Counties by Inbound and Outbound Value, 2019



Source: FAF5, disaggregated by Cambridge Systematics, Inc. 2023.

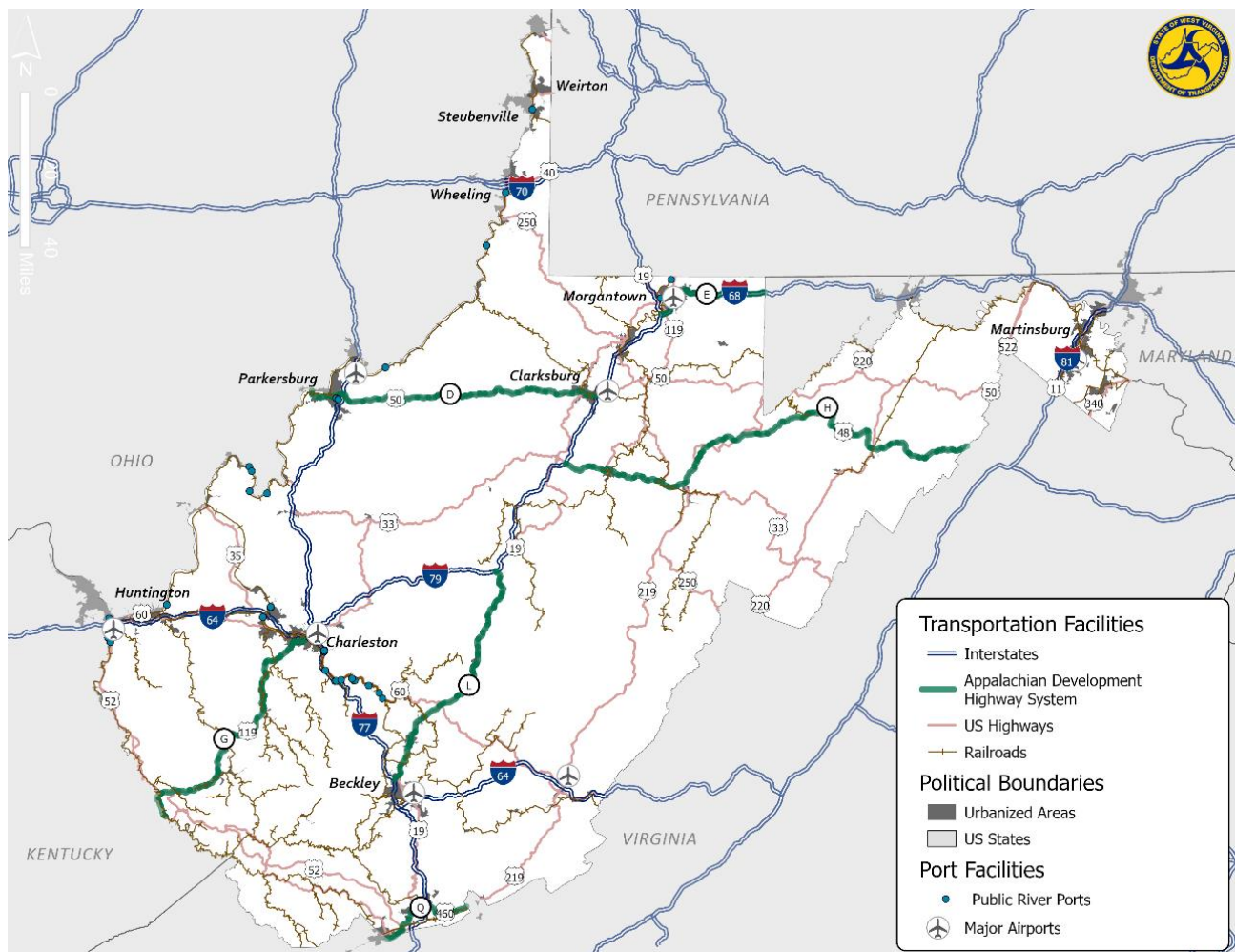
3.0 WV'S MULTIMODAL FREIGHT INFRASTRUCTURE

What does the WV multimodal freight network look like? ♦ What are the critical elements and what is the demand for freight on each? ♦ How are they performing in terms of safety, condition, mobility, reliability, and access? ♦ What technology is or could be used on the system?

3.1 WV Multimodal Freight Network

West Virginia's freight infrastructure connects the State's freight producing industries to distributors, retailers, and consumers. The State engages in a variety of resource harvesting, manufacturing, retailing, and warehousing, all of which require an interconnected, well-maintained, safe, and efficient network. This section shares highlights across the State's multimodal freight infrastructure, including highways, railroads, airports, river ports, and pipelines as presented in Figure 21. More technical details and discussion on each of these modes are available in separate technical memorandums developed for each mode produced as part of the 2023 State Freight Plan.

Figure 21. West Virginia Freight Infrastructure



Source: WVDOT Dataset, 2010 urbanized area boundaries, 2020.

Total freight traversing this network is anticipated to change in meaningful ways through 2050. From 2019 to 2050, tonnage is projected to shrink by 13 percent to 284 million tons but grow in value by over 75 percent to \$224 billion. These shifts in tonnage and value over the coming decades reflect a diversifying freight industry landscape. Identifying opportunities and threats to the State's freight inventory, understanding the production and movement of commodities within the State, and balancing freight needs with human and ecological elements are all critical in providing a safe, efficient, and resilient transportation system.

Interstates and U.S. highways connect every corner of the State, with concentrations of capacity and interconnections concentrated in metropolitan areas. Some of the highway system designations include the National Highway System (NHS), the National Highway Freight Network (NHFN), and other state and national designations. Rail infrastructure is concentrated in the coal rich southern region of the State and connects to Class I railroads connecting to Interstate markets. The State has five major airports handling air cargo in Morgantown, Parkersburg, Huntington, Lewisburg, and Charleston. The State also has dozens of river ports along the Ohio, Kanawha, and Monongahela Rivers.

3.1.1 Strategic Freight Corridors

West Virginia's strategic freight corridors include the State designated **Critical Rural/Urban Freight Corridors (CRFC/CUFC)**¹⁶, **Appalachian Development Highway System (ADHS)** (see Figure 21), **Coal Resource Transportation System (CRTS)**, and the military strategic corridors. CRFCs and CUFCs are important freight corridors that provide critical connectivity to the NHFN.¹⁷ By designating these important corridors, states can strategically direct resources toward improved system performance and efficient movement of freight on the NHFN. States, and in certain cases MPOs, are responsible for designating public roads for the CUFCs in accordance with section 1116 of the FAST Act and section 11114 of the IIJA, 2022. Designation of these corridors in West Virginia follows these requirements and approach:

- Designation of the CRFCs is limited to a maximum of 300 highway miles or 25 percent of the Primary Highway Freight System (PHFS) mileage in the State, whichever is greater. The IIJA added that a state with a population per square mile of area that is less than the national average, based on the 2010 census, may designate a maximum of 600 miles of CRFCs or 25 percent of the PHFS mileage in the State, whichever is greater. Given this addendum, West Virginia with a population per square mile of 77.1 as compared to 87.4 for the national average, can designate 600 miles of CRFCs.¹⁸
- State and MPO designation of the CUFC is limited to a maximum of 150 highway miles or 30 percent of the PHFS mileage in the State, whichever is greater. West Virginia can designate 150 miles of CUFCs.

Military significant designations (see Figure 22) include the **Strategic Highway Network (STRAHNET)**, defined as roads that provide "defense access, continuity, and emergency capabilities for movements of personnel and equipment in both peace and war," and the **Strategic Rail Corridor Network (STRACNET)**, defined as "a 33,000-mile interconnected network of rail corridors important to national defense."¹⁹ In West Virginia, there are no STRAHNET or STRACNET correlated military installations; however, all Interstate miles in the State, the 77 miles of U.S. 50 from I-79 in Clarksburg to the State border with Ohio, the

¹⁶ The most up to date designation of CRFC and CUFC can be found in the WVDOT Freight Plan [website](#).

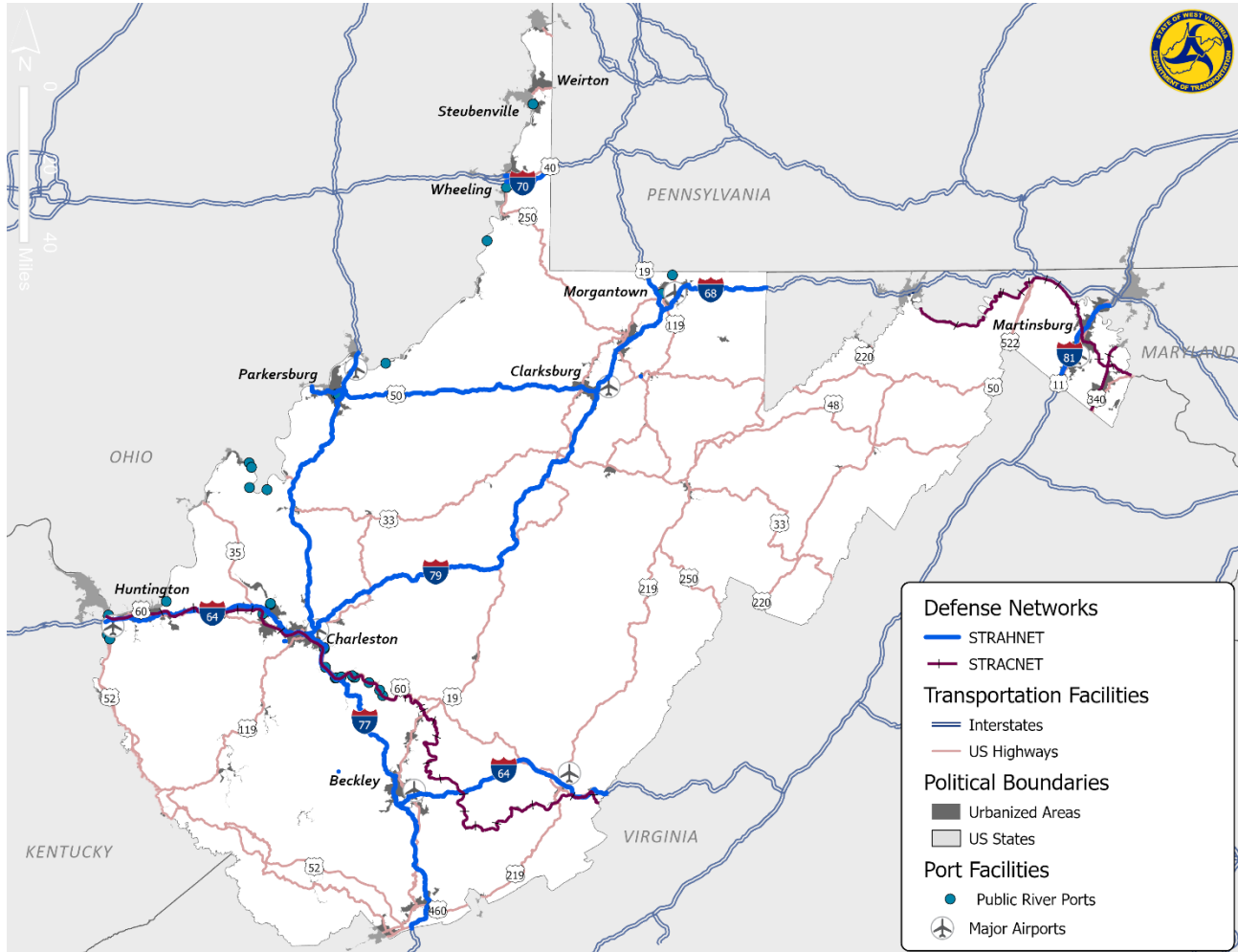
¹⁷ U.S. DOT FHWA <https://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm>.

¹⁸ Population per square mile, Census 2010. [U.S. Census Bureau QuickFacts: United States](#).

¹⁹ [Cover and STRAHNET Summary.pdf \(army.mil\)](#).

Kenova to Tuckahoe southern rail leg and the Ridgeley to Harpers Ferry northern rail leg are highway and rail corridors included in the national military strategic network.

Figure 22. West Virginia STRAHNET and STRACNET

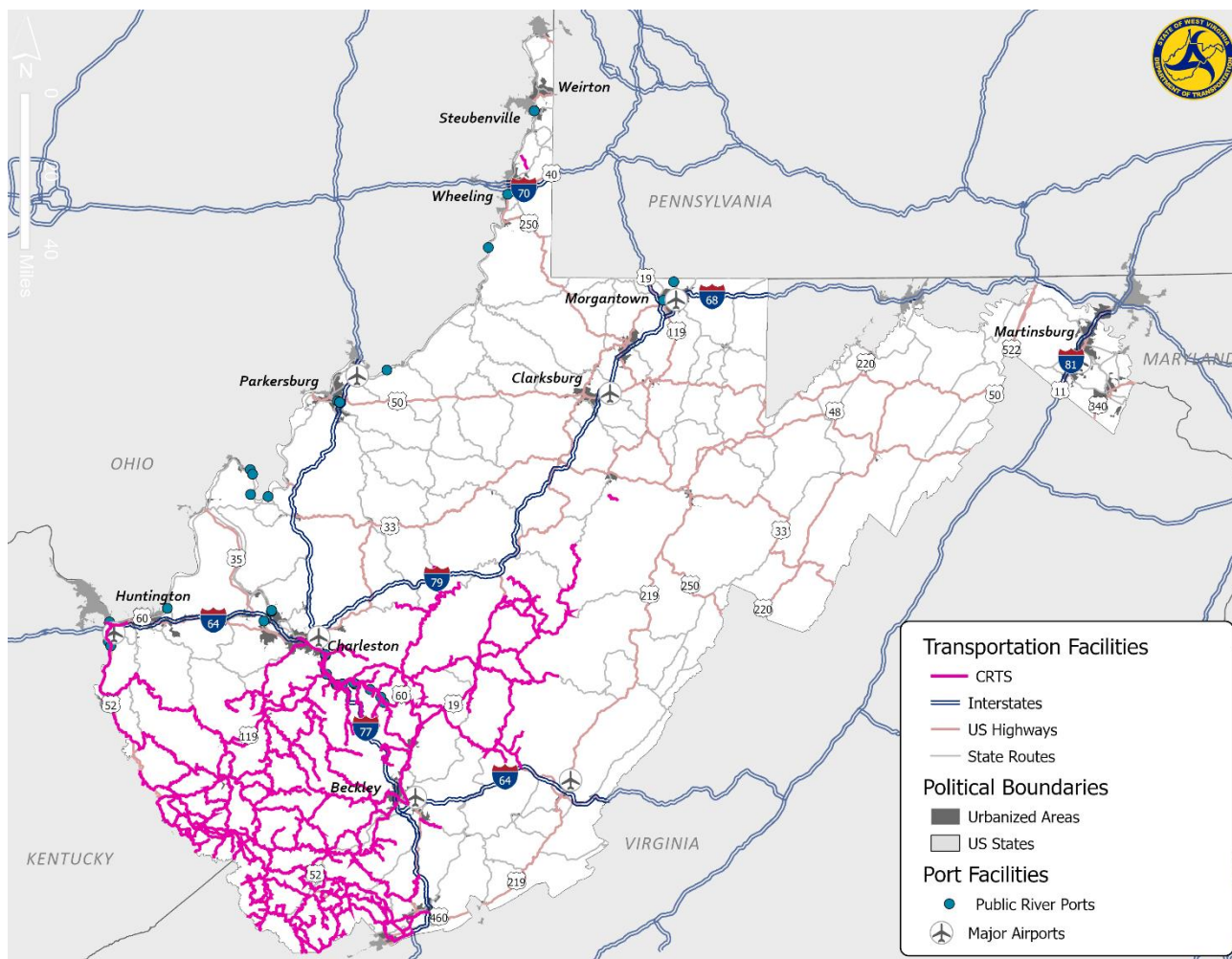


Source: U.S. DOT, FHWA, 2020.

Using Federal designations in conjunction with local freight movement and economic needs, West Virginia developed the CRTS in 2003 out of a need to determine which roadways best support coal hauler permits for gross vehicle weights (GVW) up to 120,000 pounds.²⁰ The CRTS includes 15 southern West Virginia counties, with CRTS status determined through the Coal Resource Transportation Designation Committee (CRTDC). Figure 23 shows the CRTS across southern and central West Virginia.

²⁰ [CRTS \(wv.gov\)](http://www.wv.gov).

Figure 23. West Virginia's Coal Resource Transportation System



Source: West Virginia Department of Transportation Division of Highways, 2019.

3.2 Highways

Highways are critical components of first mile and last-mile transportation, and as the most extensive system in terms of capacity and connectivity, highways carry over one-third of freight tonnage and nearly two-thirds of value in West Virginia. The highway profile details the unique attributes of the highway system in the State, the existing conditions and demands, and some of the freight-related needs.

There are approximately 3,828 centerline miles of Interstate and U.S. routes in West Virginia used to transport a variety of materials and products. System connectivity and route directness and redundancy face topographic challenges in some regions, while ongoing and long-standing investments in the ADHS and the CRTS have helped maintain corridors between cities and into rural areas. WVDOT owns, maintains, and operates the sixth largest highway system in the Nation, with over 90 percent of all roadway centerline miles maintained by WVDOT. Figure 21 shows the extent of the State's Interstate and U.S. route highway system.

**6th LARGEST
STATE-MAINTAINED
HIGHWAY SYSTEM
IN THE NATION**

3.2.1 Highway Demand

In 2019, more than 122 million tons of goods, valued at \$83 billion were transported by truck with an average value of approximately \$776 per ton.

Internal traffic made up the largest share of highway movement. In 2019, more than 66 million tons of goods, valued at \$21 billion. The average tonnage value for internal truck flow was \$318.

Outbound flow transported 35 million tons of commodity in 2019, consisting of 29 percent of the total truck tonnage, valued at \$31 billion (37 percent of total truck flow value). The average tonnage value for outbound truck flow was approximately \$886.

Inbound truck flow made up the lowest total truck flow tonnage ratio (20 million tons, 16 percent) and the highest total truck flow value (\$32 billion, 38 percent) among all truck flow directions in 2019. The average tonnage value for inbound truck flow was approximately \$1,600.

In 2050, the projected total truck movement will reach 137 million tons (12 percent increase compared with 2019 tonnage), valued at \$154 billion (85 percent increase based on 2019 value). Figure 24 shows the balance of inbound, internal, and outbound truck flow tonnage and value in 2019 and 2050.

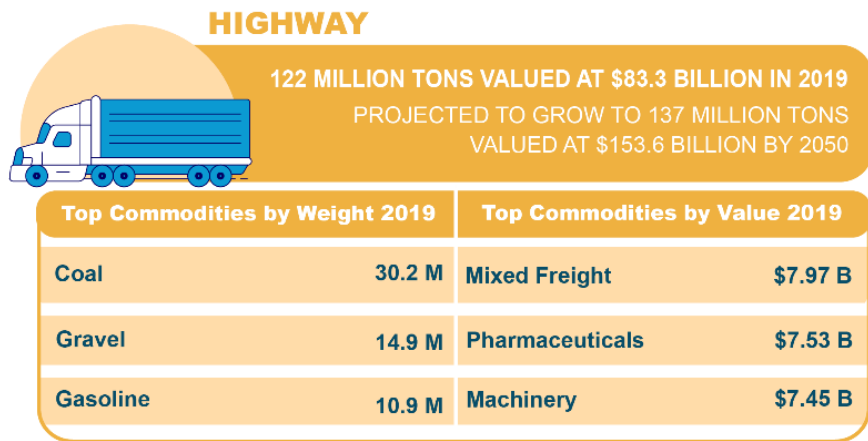
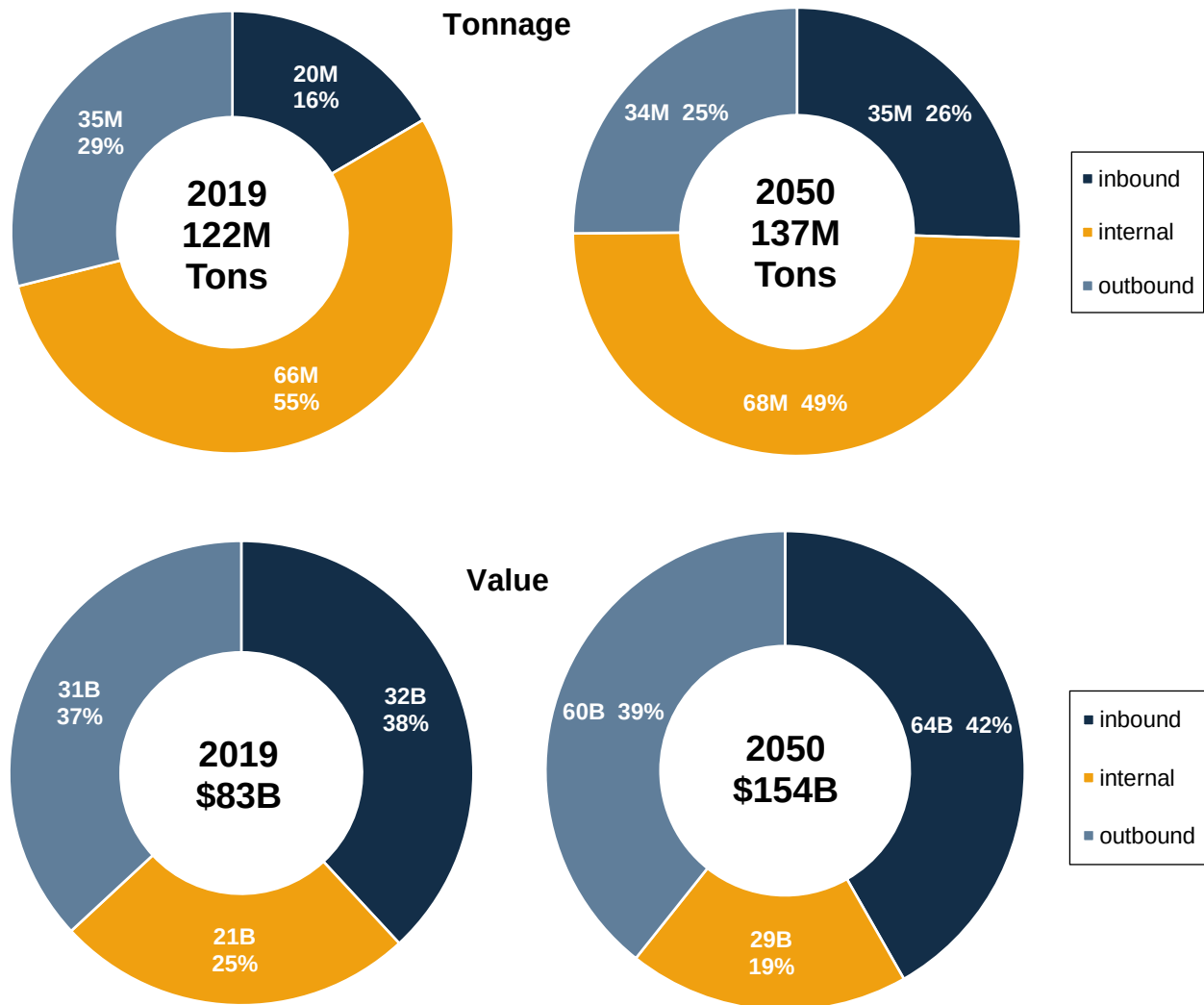


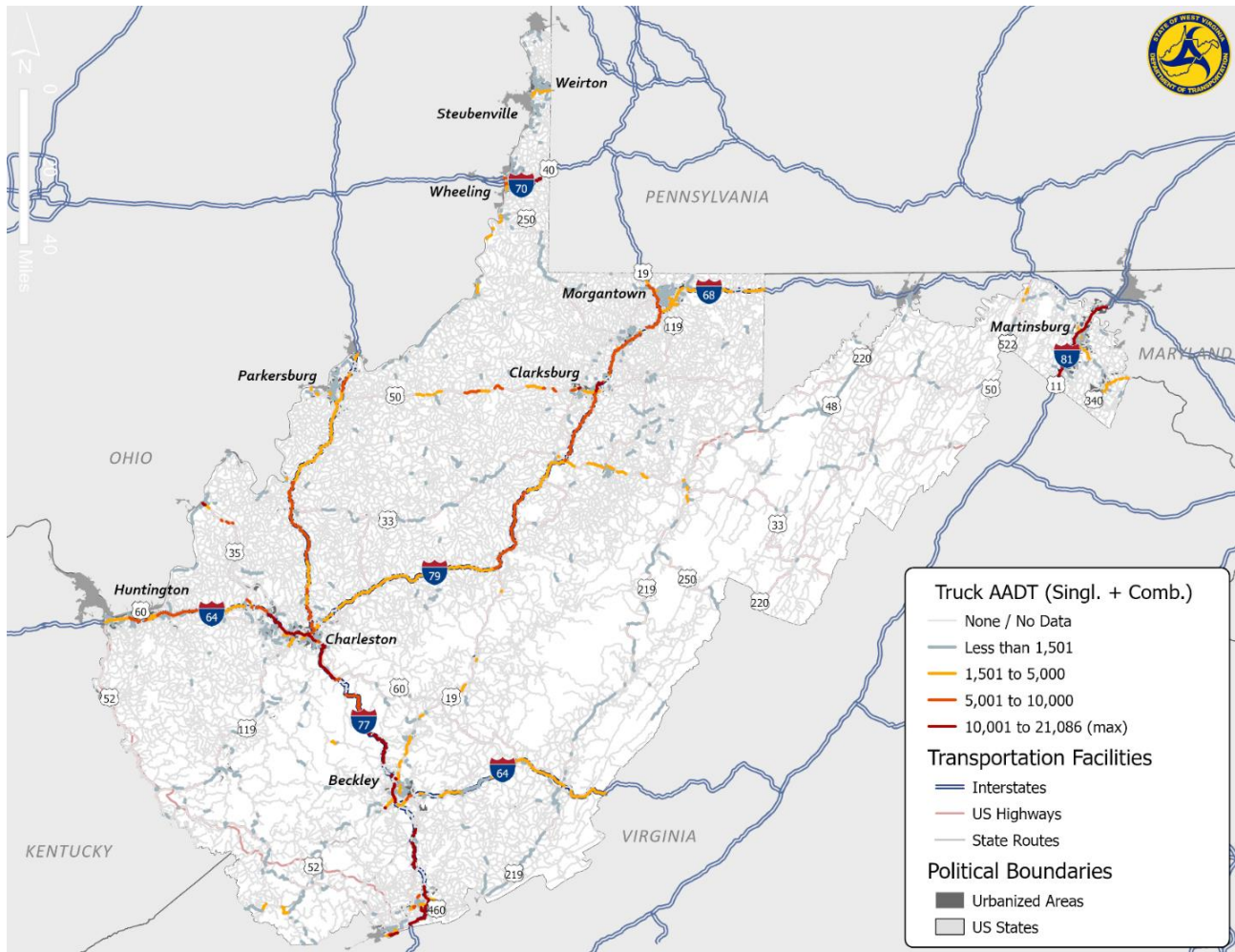
Figure 24. West Virginia Truck Tonnage and Value by Direction, 2019 and 2050



Source: FHWA FAF5 (2019–2050), disaggregated by Cambridge Systematics, Inc.

Figure 25 shows the State's roadway network by annual average daily truck traffic (AADTT). While not a perfect correlation to tonnage, AADTT does represent where most of the trucks are traveling on an average day. Interstate corridors such as I-77, I-79 and I-81 carry the highest volumes of truck in the State. Notably, U.S. 50 between Parkersburg and Clarksburg carries a substantial amount of truck traffic as well and represents the only non-Interstate STRAHNET facility in the State.

Figure 25. West Virginia Truck AADT—Single and Combination Trucks, 2020



Source: WVDOT Dataset, 2020.

3.2.2 Highway Safety, Condition, and Performance

The purpose of the conditions and performance analysis is to understand the demands on the State's highway freight network and see where the system is meeting (or failing to meet) those demands.

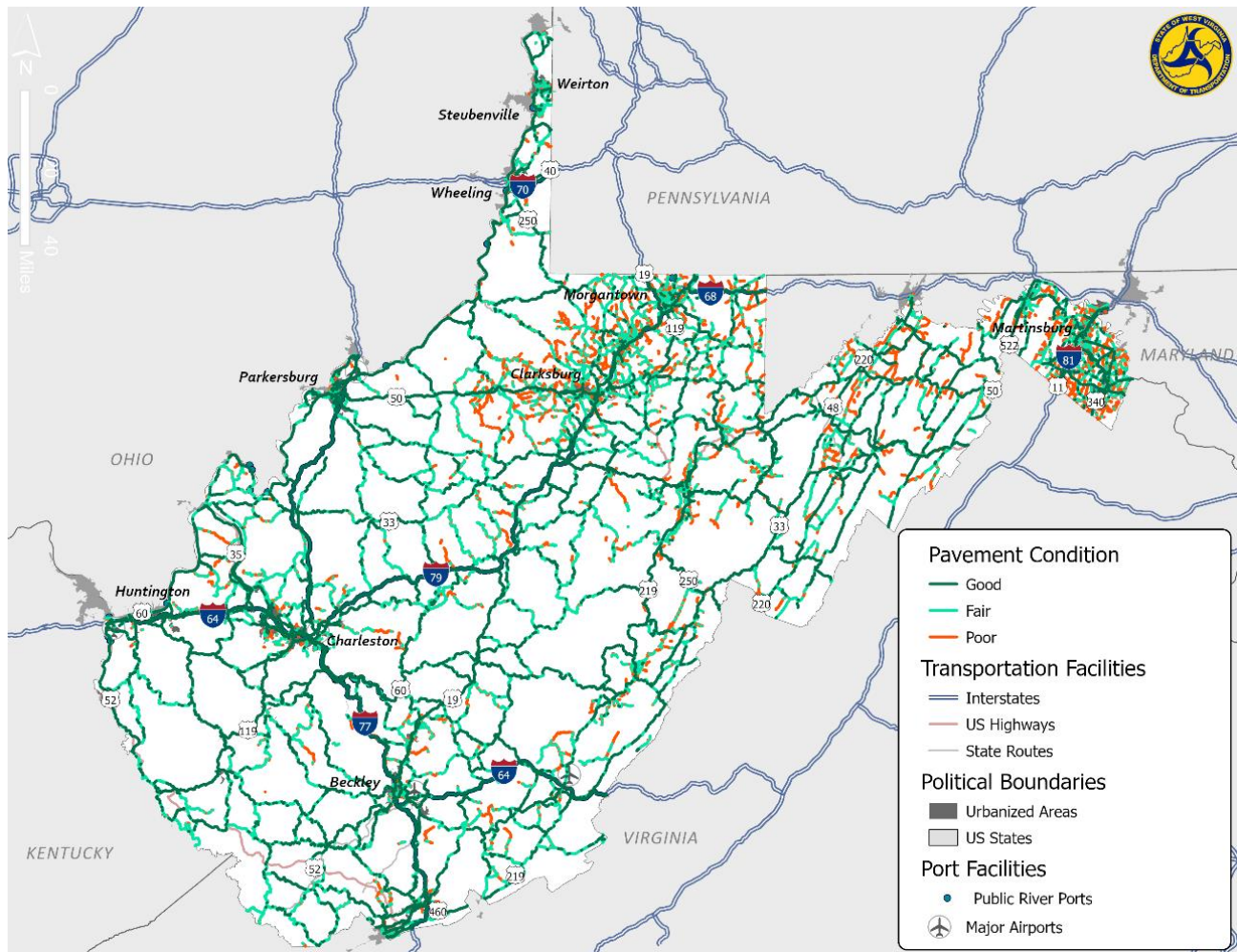
Pavement Condition

Over the last five years (since 2017), consistent with Federal performance management requirements, WVDOT has annually tracked and reported pavement condition on the NHS. As depicted in Table 4 the percentage of lane miles in poor condition on both Interstates and other NHS roadways (which includes U.S. routes like U.S. 50, U.S. 19, U.S. 52, and U.S. 35) has remained at or below 2 percent. Pavement conditions throughout West Virginia, including off-NHS facilities such as West Virginia routes and local roads are depicted in Figure 26. Pavement condition is collected less frequently on these roadways, resulting in an incomplete statewide sample. These roads, while carrying low truck volumes, do face pavement condition challenges that are being addressed through programs like the Secondary Roads Maintenance Initiative.

Table 4. Pavement Condition Trends on the National Highway System

Measures	2017	2018	2019	2020	2021
Interstate System					
% Lane Miles in Good Condition	73.4%	78.7%	80.6%	73.6%	73.8%
% Lane Miles in Fair Condition	16.5%	21.1%	19.4%	25.9%	25.8%
% Lane Miles in Poor Condition	0.1%	0.2%	0.0%	0.5%	0.4%
Non-Interstate NHS					
% Lane Miles in Good Condition	40.9%	40.0%	43.0%	43.3%	46.5%
% Lane Miles in Fair Condition	57.9%	58.7%	55.0%	55.2%	52.6%
% Lane Miles in Poor Condition	1.2%	1.3%	2.0%	1.5%	0.9%

Figure 26. Pavement Conditions Statewide



Source: FHWA, Highway Performance Monitoring System, 2020; Cambridge Systematics, Inc. analysis.

Bridge Condition

Of West Virginia's over 7,300 bridges, 844 bridges carry routes that are part of the NHFN. The NHFN routes are those that are considered most essential to national goods movement. Of the 844 bridges, 121 bridges (about 14 percent) were rated as being in poor condition based on 2021 data. Table 5 provides the breakdown of bridge condition by owner. Note, this measure represents the number and percent of bridges, which is different than the FHWA required performance measure for the percent of deck area in good or poor condition. In 2021, 14.1 percent of NHS bridge deck area was in poor condition (so roughly equivalent to the number of bridges, meaning that larger or smaller bridges are not proportionally in better or worse shape than all bridges).

Table 5. Condition of West Virginia Bridges on the National Highway Freight Network, 2021

Owner	Poor	% Poor	Fair	% Fair	Good	% Good	Total
Division of Highways	121	14%	507	60%	119	14%	747
WV Turnpike	–	0%	93	11%	4	0.4%	97
Total	121	14%	600	71%	123	15%	844

Source: FHWA, *National Bridge Inventory, 2021*; Cambridge Systematics, Inc. analysis.

Travel Time and Reliability

When considering mobility and reliability, truck bottlenecks are a top concern for freight travel. Truck bottlenecks occur when trucks are delayed by slow speeds due to recurring traffic congestion, truck travel times are inconsistent due to planned or unplanned events (including incidents or work zones), or where restrictions limit truck travel (such as posted bridges).²¹ West Virginia previously identified its freight bottlenecks as part of the October 2022 Baseline Performance Period Report and tracks their performance on an ongoing basis as part of FHWA required performance reporting.²² The bottlenecks identified in Table 6 were determined through overlaying three critical sets of data—truck tonnage data, travel time reliability data, and needs identified by stakeholders through the prior Freight Plan (and complemented by outcomes of the 2050 LRTP and the State Rail Plan). As determined by the WVDOT October 2022 Baseline Performance Period Report, these bottlenecks met the following criteria:

- Greater than 20,000 annual truck tonnage consistent with 2012 Freight Analysis Framework (FAF) data.
- Planning time index and/or truck travel time reliability at seven or above.
- Identified as a need by stakeholders during the Freight Plan outreach.

²¹ FHWA, *Truck Freight Bottleneck Reporting Guidebook*, FHWA-HOP-18-070, July 2018, <https://www.fhwa.dot.gov/tpm/guidance/hop18070.pdf>.

²² 23 U.S.C. 150.

Table 6. West Virginia Highway Truck Freight Bottlenecks

Bottleneck Location
I-81 from Exit 12 to Maryland State Line
I-70 from Ohio State Line to Pennsylvania State Line
I-64 from Exit 28 to Exit 59
I-77 from Exit 40 to Exit 48 (U.S. 19)
U.S. 35 from Buffalo Bridge to existing 4-lane section in Mason County (approximately 14 miles)
I-79 from Exit 115 to Exit 121
I-77 from Exit 89 to Exit 96
I-77 from Exit 9 to Virginia State Line (East River Mountain Tunnel)
I-79 from Exit 152 (U.S. 19) to Pennsylvania State Line
Appalachian Highway Development System—Corridor H: U.S. 23/U.S. 48 from Weston WV to Strasburg VA.

In addition to truck bottlenecks, several metrics are used to determine truck freight reliability. One primary metric is the truck travel time reliability (TTTR) index which measures the ratio of the 95th percentile travel time to the 50th percentile travel time. A higher TTTR index indicates more severe reliability challenges within a corridor. In 2022, the TTTR index for Interstates was 1.26 which is a slight increase from 2020 and 2021 conditions which were impacted by lower traffic volumes associated with economic and travel impacts due to the COVID-19 pandemic. The 2022 value is at or lower than 2018 and 2019 levels, and consistent with expectations given the ongoing reliability impacts associated with work zones across West Virginia on Interstates (particularly on I-70 in the Wheeling region).

Other metrics include the truck Travel Time Index (TTI) which is a measure of congestion intensity on a roadway network. It is calculated as the ratio of the average truck travel time to the reference travel time: $TTI = \frac{\text{Mean Truck Travel Time}}{\text{Reference Travel Time}}$. Thus, TTI reflects the degree to which speeds decline during peak periods. A low truck TTI indicates that the peak and off-peak travel periods have the same level of intensity. Conversely, a high TTI indicates that peak-period performance is much worse relative to its off-peak performance. Figure 27 shows the maximum observed truck TTI for the NHS routes across the State. Notably, many of the worst segments are in the State's most populous cities and the freight non-Interstate corridors in the southern portions of the State.

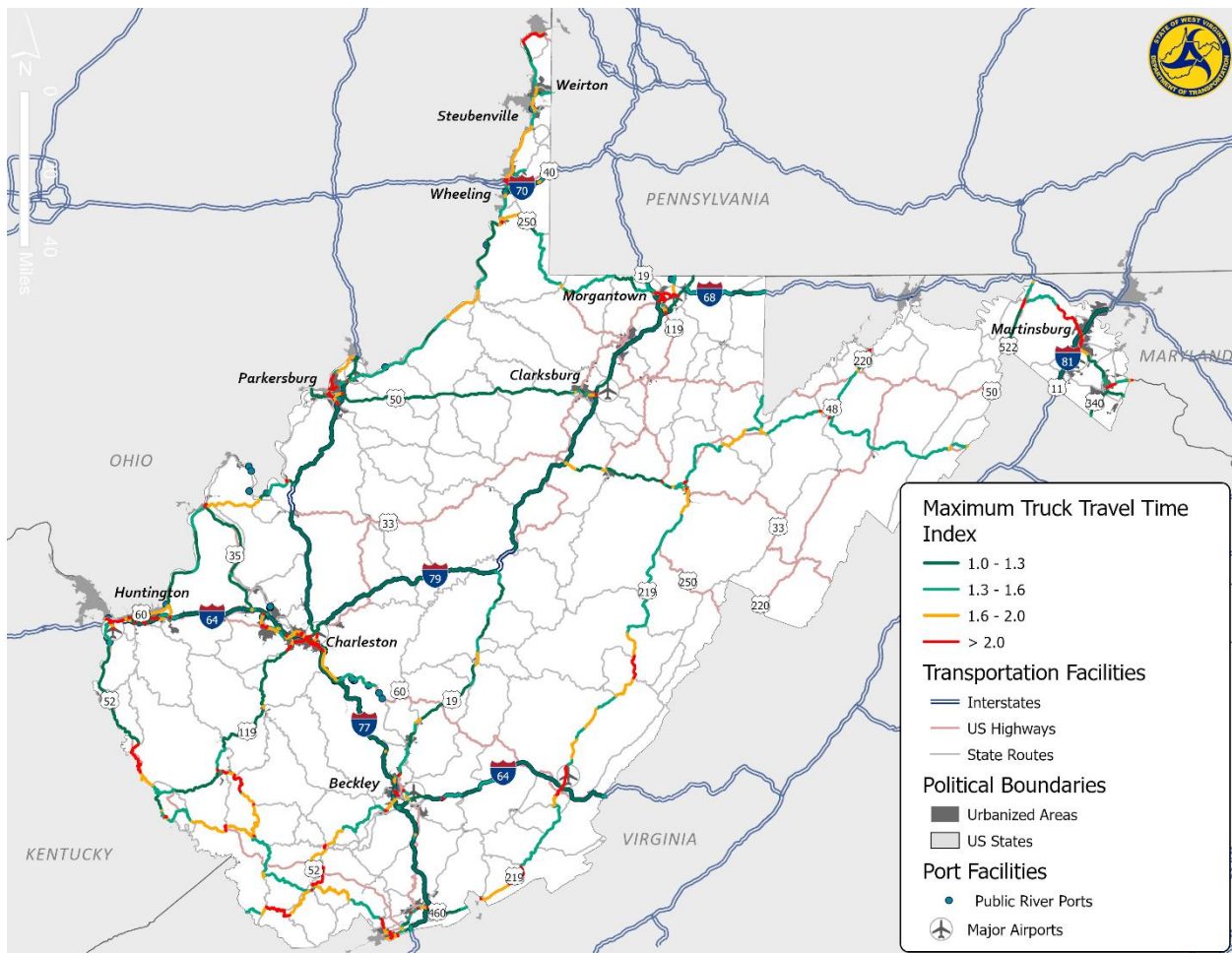
Highway Safety

There were 518 fatal and serious injury crashes involving trucks in West Virginia based on 2017–2021 data as shown in Figure 28. This represents around 10 percent of all fatal and serious injury crashes in the State. The number of fatal and serious injury crashes remained constant from 2017 to 2021 with an average of about 104 truck-involved crashes per year. Over the analysis period, the annual number of fatal and serious injury truck-involved crashes in the State ranged from a low of 83 crashes in 2020 to a high of 118 in 2018. In 2021, just over 12 percent of fatal and serious injury crashes involved a commercial motor vehicle (CMV).

Of the State's 518 fatal or serious injury truck crashes in the five years between 2017 and 2021, 445 (about 86 percent) occurred on Interstate highways, U.S. routes, or State routes. Approximately 37 percent of these crashes happened on Interstate highways. Interstate highways accounted for about 30 percent of total vehicle-miles traveled (VMT) in 2021 despite Interstate highways comprising only 2.9 percent of total lane-miles.²³

²³ FHWA, "Table VM-2: Vehicle-miles of travel by functional system" and "Table HM-60: Estimate lane-miles by functional system," *Highway Statistics*, 2020.

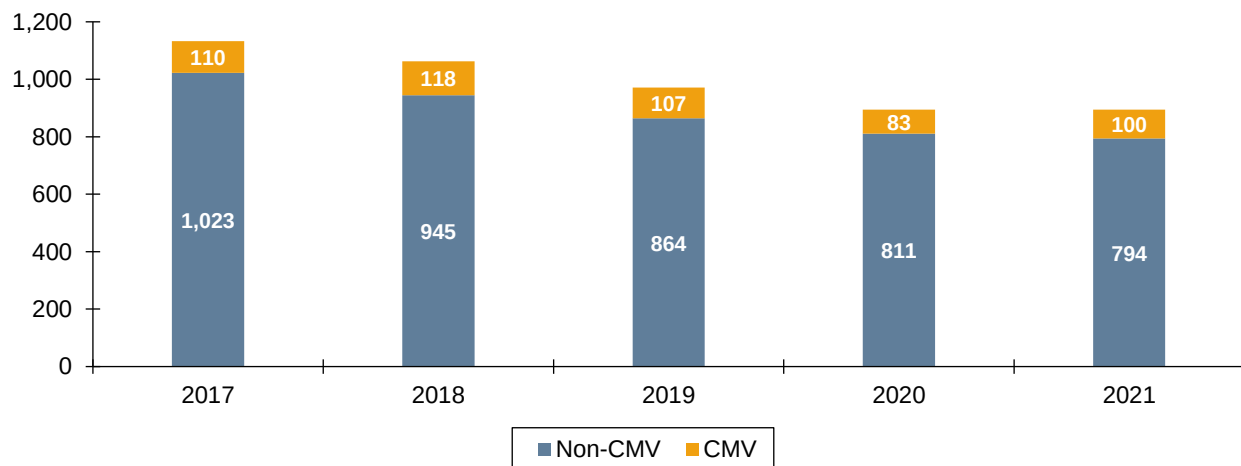
Figure 27. Maximum Truck Travel Time Index, 2021



Source: National Performance Management Research Dataset; WVDOT; Cambridge Systematics, Inc. analysis.

Figure 28. Fatal and Serious Injury Crashes for CMV and non-CMV Vehicles by Year

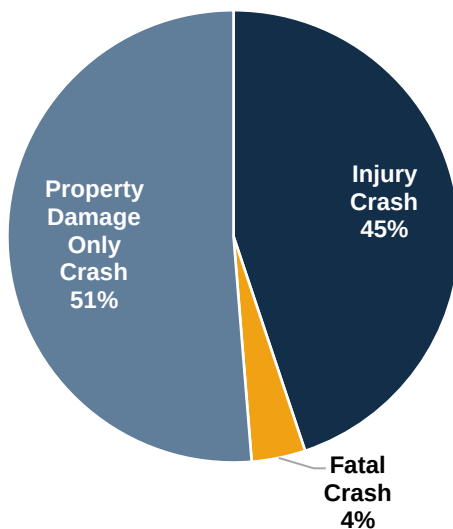
Fatal and Serious Injury Crashes



Source: WVDOT; Cambridge Systematics, Inc. analysis.

Concern surrounding adequate and safe truck parking has grown nationally since the passing of Jason's Law as part of Moving Ahead for Progress in the 21st Century Act (MAP-21). Jason's Law established a "national priority on addressing the shortage of long-term parking for commercial motor vehicles on the NHS to improve the safety of motorized and nonmotorized users and for commercial motor vehicle operators." The law also required FHWA and state DOTs to evaluate and develop metrics to measure the capability to provide adequate parking and rest facilities for trucks. Jason's Law helps address problems created by trucks parked in unauthorized locations. Unauthorized locations include trucks parked on the roadway shoulder, entrance/exit ramp, median, or other roadside location. In total, there were 78 crashes involving parked trucks between 2017–2021. Figure 29 shows that about 4 percent of these crashes resulted in a fatality, and about half resulted in some type of injury.

Figure 29. Parked Truck-Involved Crashes by Severity, 2017–2021



Source: WVDOT; Cambridge Systematics, Inc. analysis.

3.2.3 Highway Technology and ITS

This section inventories the current ITS and technology programs on West Virginia's highways by summarizing the devices, systems, and data available within WVDOT's existing ITS program. ITS is critical for facilitating the efficient movement of goods and for mitigating disruptions on the system due to incidents and other forms of nonrecurring congestion.

The various elements of the State's ITS are managed by Traffic Management Centers (TMC). TMCs serve as operational centers with one or more human operators that provide access to all data collection, processing, and dissemination equipment available. In this sense, they serve as a hub for data movement in traffic management systems. Typically, TMCs correspond to larger metropolitan areas that experience higher traffic volumes. WVDOT operates two TMCs—the WVDOT Central Headquarters TMC and the Marshall University Rahall Transportation Institute Back-Up TMC and Training Center.²⁴ Table 7 identifies the ITS field devices that are available in the State's Advanced Traffic Management System (ATMS) platform. WVDOT's devices are managed completely wirelessly as there is no fiber optic cable in the State's system.

²⁴ <https://www.q-free.com/reference/wvdoh-tmc-statewide-atms-west-virginia/>.

Table 7. ITS Device Types

Device	Statewide Count	Description
Closed-Circuit Television (CCTV) Camera	80+	CCTV cameras provide coverage on high-traffic corridors. They feed back to the traffic management centers, allowing for quick response times to incidents on the road network.
Dynamic Message Signs (DMS)	100+	Dynamic message signs display important messages to drivers on key corridors.
Weigh-in-motion Stations (WIM)	30	WIM stations capture and record truck axle weights and GVW as they drive over a sensor. They can also be used to provide vehicle counts.
Classification Count Stations (CCS)	50+	Classification count stations provide information on both the volume of vehicles traversing a section of roadway and their classification according to the FHWA 13-vehicle classification system.
Road Weather Information Systems (RWIS)	50+	A Road Weather Information System (RWIS) is comprised of Environmental Sensor Stations (ESS) in the field, a communication system for data transfer, and central systems to collect field data from numerous ESS. These stations measure atmospheric, pavement and/or water level conditions.

Source: FHWA, 2022.

In addition to these field devices, WVDOT incorporates 511 into its ITS program and operates a truck parking availability system (TPAS). The 511 program was established by the Federal Communications Commission (FCC) in 2000 with the goal of providing a single national phone number as the source for all things related to traveler information. Several states, including West Virginia, incorporate 511 into ITS programs as a traveler information dissemination method. WVDOT operates a TPAS along I-81 which monitors real-time usage of truck parking and disseminates that information to motor carriers via dynamic message signs, 511, and mobile applications.

3.2.4 Truck Parking

In total, there are 60 truck parking facilities—public and commercial—providing approximately 1,860 truck parking spaces in West Virginia. Table 8 organizes truck parking facilities by six typologies that describe the level of amenities present at the facility for truck drivers.

Public facilities are based on WVDOT naming conventions. Rest areas and welcome centers both provide parking, restrooms, and potentially vending machines. Travel plazas provide amenities by partnering with commercial entities who provide food and fuel for drivers.

Commercial facilities include truck stops which provide full-service amenities such as specialized fueling stations, maintenance facilities, showers, food, etc. Gas stations typically provide fuel, food, and restrooms, but not the other amenities offered at full-service truck stops. Other commercial facilities are any facility that does not provide fuel but allow drivers to park overnight. These include restaurants, retail establishments, and commercial parking lots.

Commercial facilities make up 66 percent of the total truck parking capacity in West Virginia. The nine full-amenity truck stops in the State account for 755 spots or 41 percent of the State's capacity. However, the typical truck parking facility in West Virginia provides 10 to 20 spots. Additionally, 40 facilities (or 67 percent of all facilities in the State) have 20 spots or fewer.

Table 8. Truck Parking Typologies

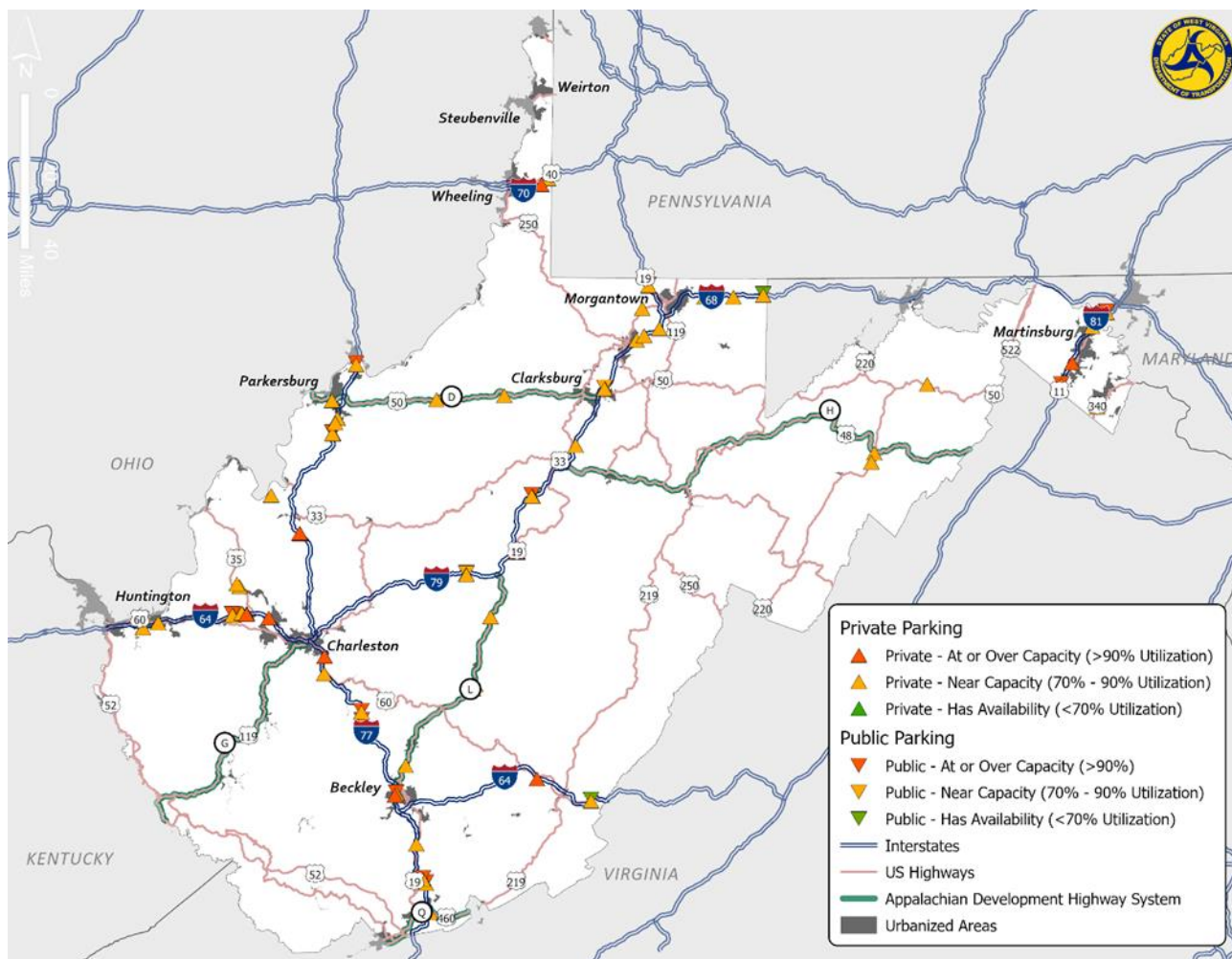
Type of Facilities	Number of Facilities	Parking Capacity
Public		
Travel Plaza	2 (3%)	137 (7%)
Welcome Center	9 (15%)	283 (15%)
Rest Area	13 (22%)	216 (12%)
Commercial		
Truck Stop	9 (15%)	755 (41%)
Gas Station	22 (37%)	414 (22%)
Other Commercial Facilities	5 (8%)	55 (3%)
Total	60	1,860

Figure 30 displays truck parking locations across the State and their level of utilization. Using truck GPS data, the American Transportation Research Institute (ATRI) estimated the demand for truck parking at 47 of the 60 sites identified in the inventory. Demand for truck parking was estimated at all public sites as well as major private sites, but smaller and more isolated private sites that were not frequented by drivers were not included in the demand estimates.

Parking demand at designated locations was estimated for typical peak hour truck parking (1 AM – 2 AM). The Federal Motor Carrier Safety Administration Hours of Service Regulations require truck drivers to take a 10 hour break after 11 hours of driving. This break usually occurs overnight. Drivers fill up commercial facilities which are preferred for their amenities starting in the evening and then public facilities when no more spots are available. By 1 AM most trucks stopping overnight are parked and a reasonable estimate of the peak demand can be made. 47 sites had parking demand data available, 34 percent of the locations have availability during peak hours, 15 percent are near capacity, and almost 50 percent are at or over capacity. Note that “Has Availability” is defined as anything under 70 percent utilization. Over 65 percent of the state’s public sites are near, at, or over capacity. These results indicate that, in general, demand exceeds capacity at the statewide level.

More detailed analysis and discussion on truck parking inventory, demand, safety, and stakeholder engagement conducted as part of this 2023 State Freight Plan is available in the *Truck Parking Profile*.

Figure 30. Truck Parking Utilization in West Virginia



Source: ATRI; Cambridge Systematics, Inc. analysis, 2022.

Note: Facilities built near or after the initial analysis of available parking inventory may not be displayed here. At least one location along I-81 has been noted a Rutter's facility with 18 truck parking stalls.

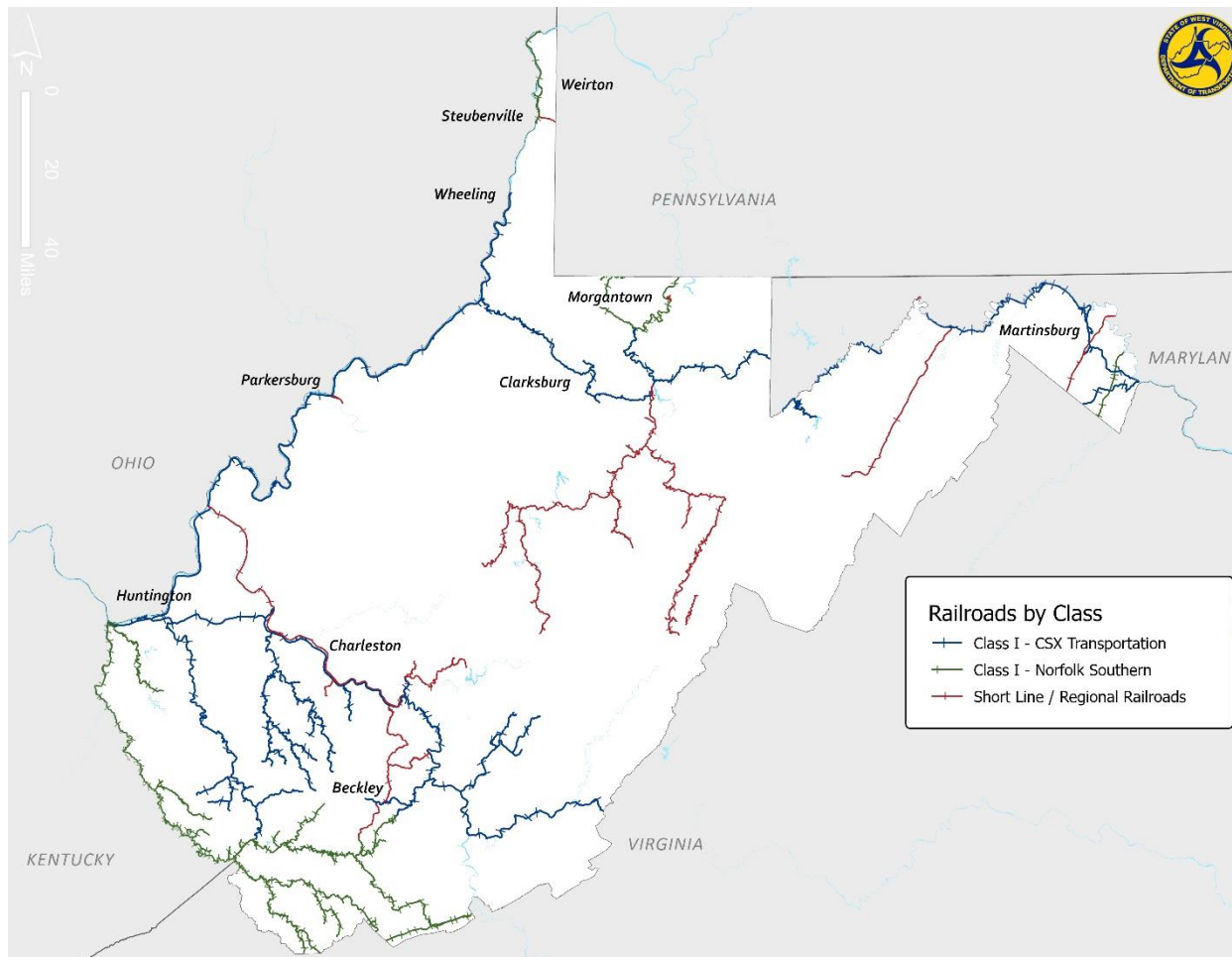
3.3 Rail

Eleven freight railroads operated in West Virginia covering a total of 2,123 route miles.²⁵ Rail is central to the State's history and culture, serving to carry goods across the State and linking its industry with the Nation. West Virginia's freight rail network connects industries, largely coal producers, originating from within the State and moving to consumers in adjacent states and to export terminals at tidewater. While coal continues to be the primary export from West Virginia on a tonnage basis, other rail-oriented industries, including chemicals and automotive, are expected to grow. In addition, as some areas within the State transition from an economy based on natural resources to a tourism-based economy, a part of the rail network has been used in support of the growing tourism industry.

²⁵ <https://www.aar.org/wp-content/uploads/2021/02/AAR-West-Virginia-State-Fact-Sheet.pdf>.

For freight railroads, the most common classification is by revenue, with classifications defined by the U.S. Surface Transportation Board (STB) as Class I (revenue more than \$505 million), Class II regional (more than \$40 million revenue) and Class III short line, as presented in Figure 31.

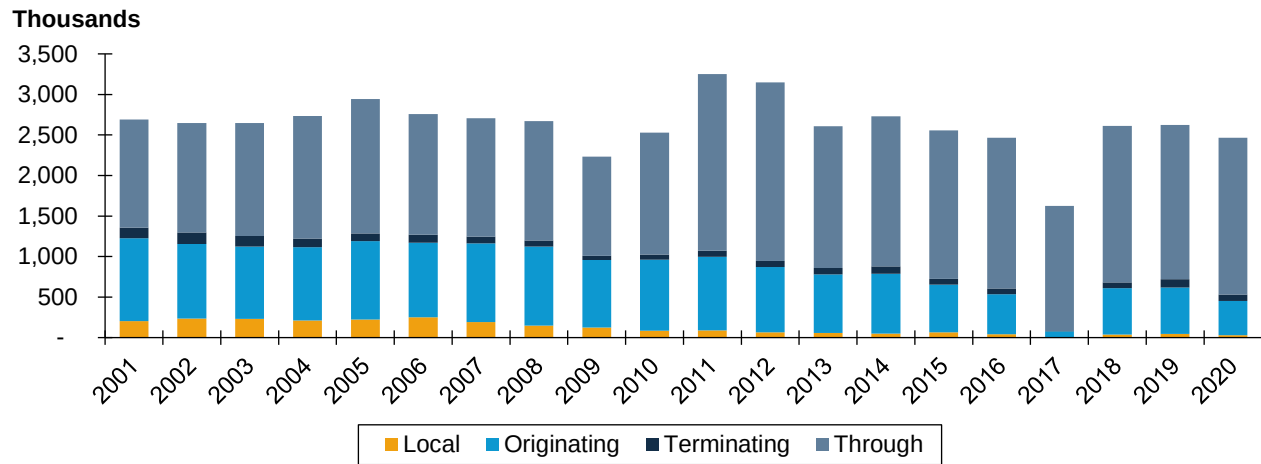
Figure 31. West Virginia Railroads by Classification



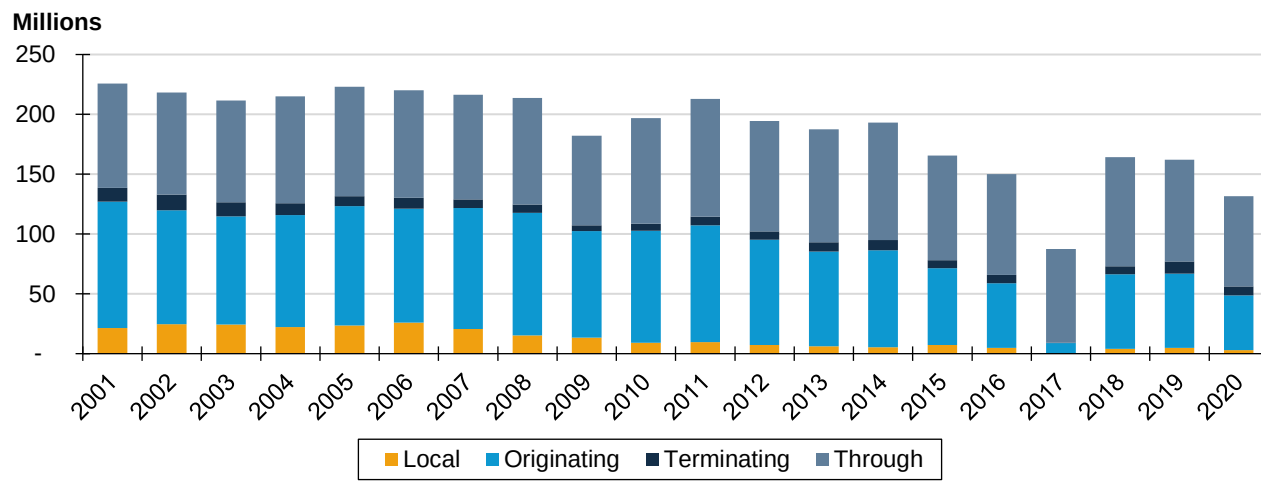
In 2021, two Class I Railroads, CSX Transportation (CSXT) and Norfolk Southern Corp. (NS), operated a total of 1,871 miles within West Virginia. These Class I railroads operate the vast majority of freight rail trackage in West Virginia, accounting for 78.5 percent of all route miles within the State. Currently, West Virginia hosts one regional railroad, Wheeling & Lake Erie Railway, which operated across the northern panhandle of the State and connects with the CSXT at Benwood, West Virginia near Wheeling. Eight short line railroads, including two owned by the State, operated the remaining 467 route miles. These railroads provide the only link to the national rail network for many rail-served industries across the State, and thus serve an important role in ensuring the continued availability of freight rail service.

3.3.1 Rail Demand

Coal has historically been the dominant theme of West Virginia rail. Overall rail traffic has experienced a gradual decline since 2001 that is largely a reflection of waning coal production in West Virginia, having reduced both originating tonnage and carloads (see Figure 32 and Figure 33). As a result, through traffic has taken an increasingly larger share of overall rail traffic.

Figure 32. Freight Rail Carloads, 2001–2020

Source: STB Confidential Waybill Sample, 2001–2020.

Figure 33. Freight Rail Tonnage, 2001–2020

Source: STB Confidential Waybill Sample, 2001–2020.

Figure 34 and Figure 35 provide a perspective on the uneven impacts of the COVID-19 pandemic on rail traffic, with a summary of rail traffic originating and terminating in West Virginia in 2019 and 2020. While coal volumes remained steady, other commodities, particularly construction products saw a major decline from 2019 to 2020.²⁶ By 2021, overall freight rail traffic across North America experienced a substantial recovery, but as of mid-2023 has yet to regain prepandemic levels.²⁷

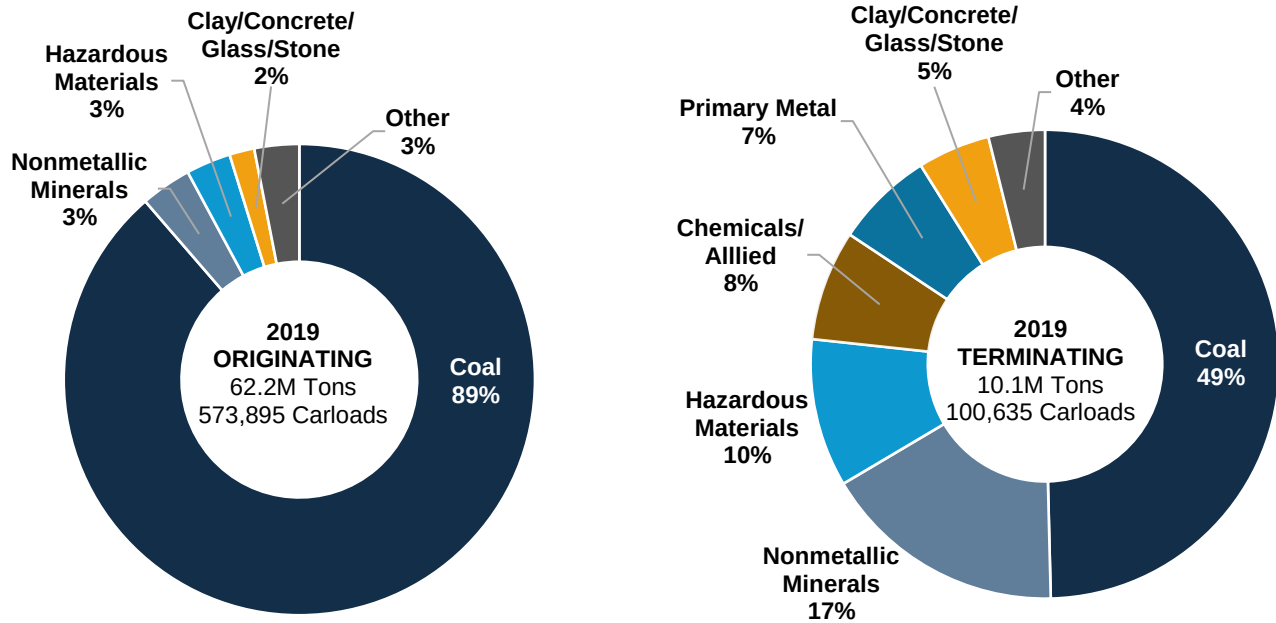
The utilization of the State's rail network for through traffic (Figure 36), which accounted for over 50 percent of total volume in 2019 and 2020 (see Figure 33), is considerably more diverse than that of traffic originating

²⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10034561/>.

²⁷ <https://www.trains.com/trn/news-reviews/news-wire/chemical-shippers-say-rail-service-remains-mired-below-pre-pandemic-levels/#:~:text=WASHINGTON%20%E2%80%94%20Most%20chemical%20shippers%20say,2020%20before%20the%20pandemic%20hit.>

and/or terminating. However, coal was still the single largest commodity, accounting for 35 percent of the throughput in 2019 and 43 percent in 2020.

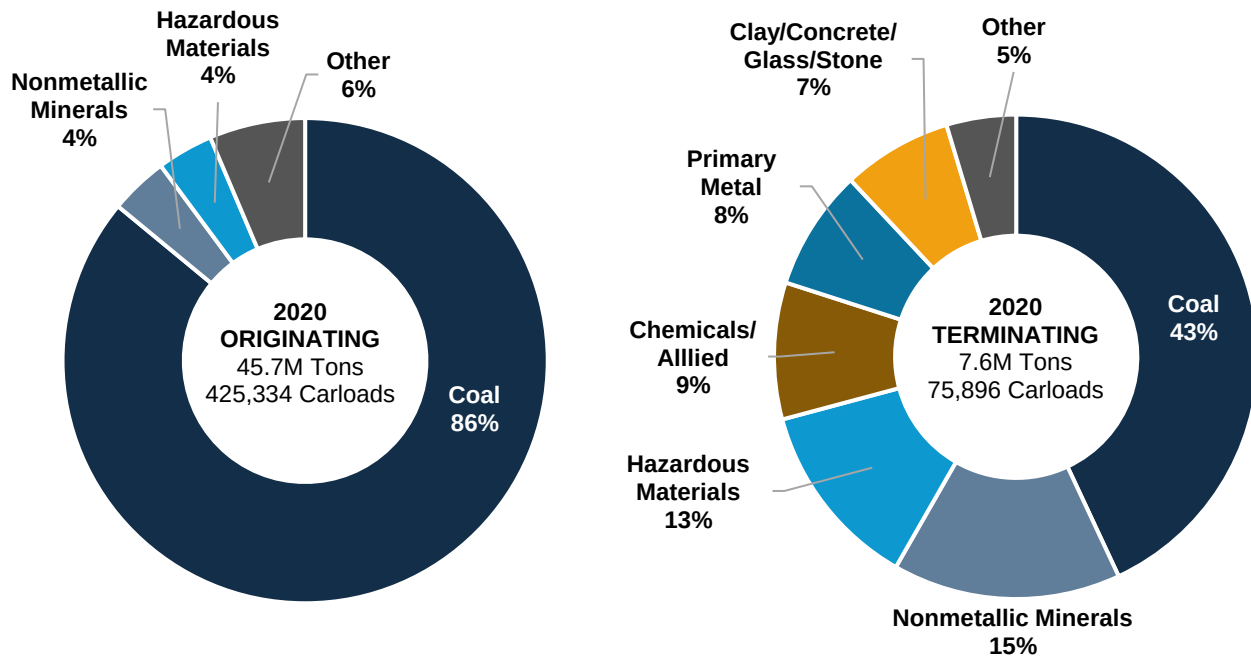
Figure 34. Rail Traffic Originating and Terminating in West Virginia, 2019



Source: STB Confidential Carload Waybill Sample, 2019.

Note: Other category includes Chemicals/Allied, Petroleum/Coal, Waste/Scrap Materials, Primary Metal, Pulp/Paper/Allied, Lumber/Wood, Transportation Equipment, Freight All Kind, Shipping Containers, Food/Kindred.

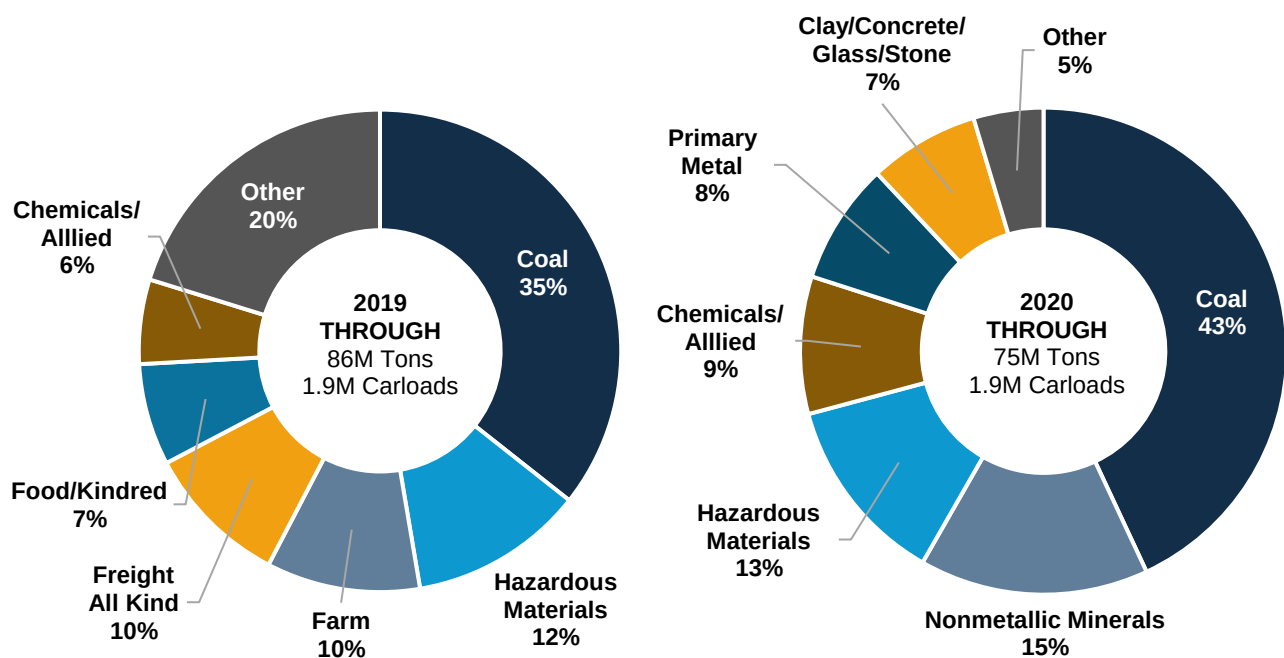
Figure 35. Rail Traffic Originating and Terminating in West Virginia, 2020



Source: STB Confidential Carload Waybill Sample, 2020.

Note: Other includes Clay/Concrete/Glass/Stone, Chemicals/Allied, Petroleum/Coal, Waste/Scrap Materials, Pulp/Paper/Allied, Primary Metal, Lumber/Wood, Transportation Equipment, Food/Kindred.

Figure 36. Through Rail Traffic in West Virginia, 2019 and 2020



Source: STB Confidential Carload Waybill Sample, 2019 and 2020.

Future Freight Rail Demand

FHWA's FAF forecast projects a shift in freight volumes moving through West Virginia. Through 2050, West Virginia's overall tonnage handled by rail is likely to fall by over 40 percent from 2019 levels. Inbound traffic is expected to remain flat, while on a value basis a shift towards higher value commodities will result in a 40 percent increase in overall value of the commodities shipped, from \$5.7 billion in 2019 to \$7.9 billion in 2050 (see Table 9). Opportunities to grow traffic are principally associated with continued development of natural gas production from the Marcellus, Rogersville, and Utica shale formations, as well as growth in the aerospace, automotive and chemicals manufacturing sectors. While West Virginia has traditionally been a carload market, maximizing the opportunity to capture traffic from these growing industries will not only require access to competitive carload service but also intermodal.

Table 9. West Virginia Projected Freight Rail Commodity Flows, 2019 and 2050

Metric	2019			2050		
	Within West Virginia	Outbound	Inbound	Within West Virginia	Outbound	Inbound
Tons (Thousand)	12,047	33,824	6,800	3,304	19,274	6,659
Value (Millions 2019 USD)	\$1,076	\$2,952	\$1,632	\$1,046	\$3,486	\$3,367

Source: FHWA FAF5 (2019–2050).

3.3.2 Rail Safety, Condition, and Performance

The capacity, condition, and safety of West Virginia freight rail network is critical to the economic health of the State. This section reviews select measures that provide insight into the system's short- and long-term vitality.

Physical Conditions

A principal measure of rail system performance is the ability of the infrastructure to physically handle current and anticipated traffic volumes, while meeting service expectations and maintaining efficient operations, i.e., the capacity of the system. This physical system includes the main lines over which trains operate, the terminals and yards that process carload and intermodal traffic, the interchanges where traffic is exchanged between carriers, along with necessary ancillary facilities for servicing locomotives, maintaining railcars, and performing system maintenance.

At present, West Virginia's rail network has more than adequate physical capacity, primarily because of declining traffic volumes in recent years. Additionally, capacity is impacted by traffic mix, operating practices and the availability of appropriate labor and rolling stock assets. Typically, these can be adjusted much more rapidly in response to shifts in demand than physical infrastructure, although the recent prolonged labor shortages have materially impacted capacity nationally as well as on select routes in West Virginia.

In evaluating the ability of West Virginia's rail network to handle current and future demands, a set of physical indicators provide critical insights into how well the system is maintaining competitive relevance. These are as follows:

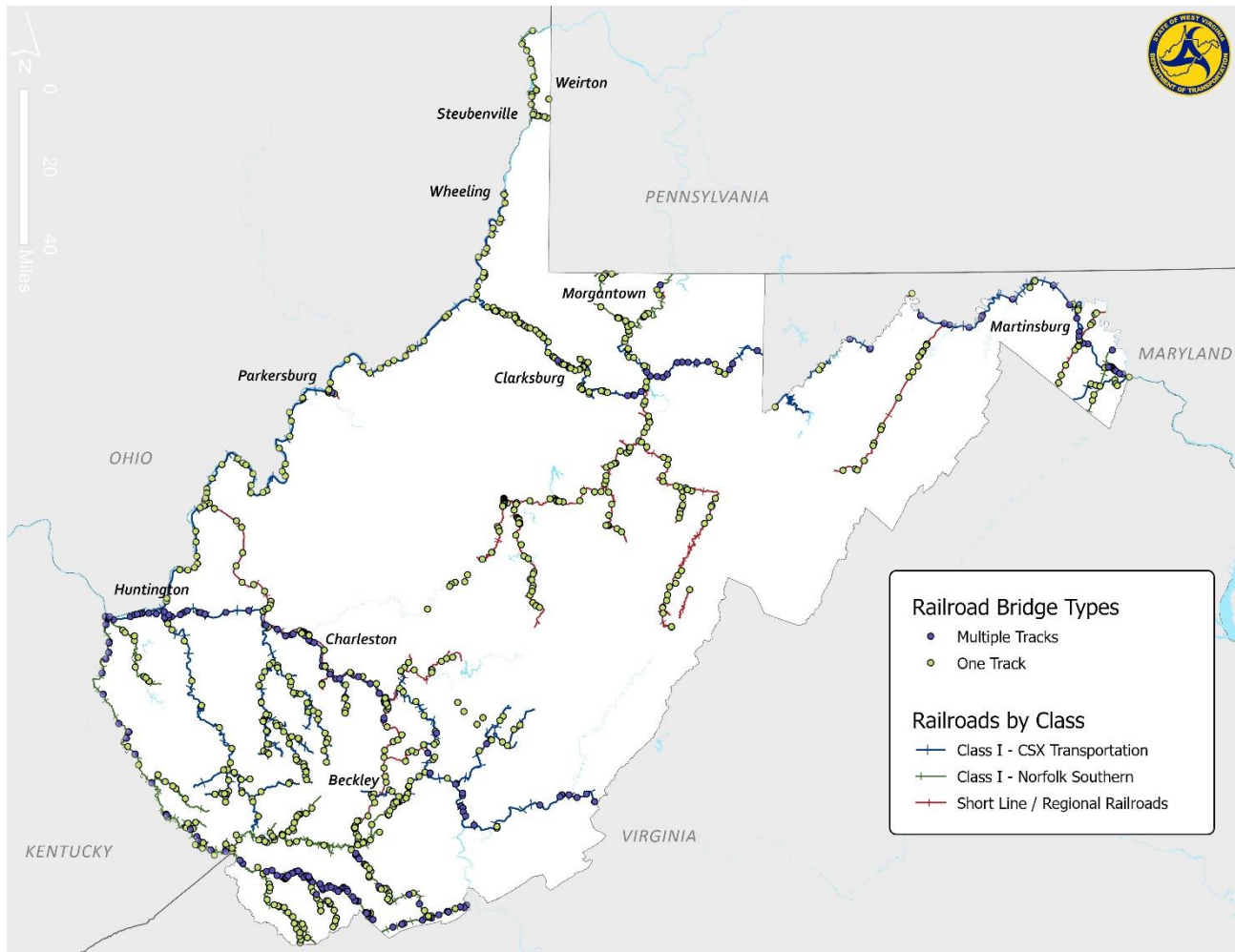
- **Weight Capacity.** Rail lines are rated by allowable weight capacity, with the current standard of 286,000-pound gross weight railcars adopted by the Class I railroads in 1995. Railcars designed for the

previous standard of 263,000 pounds have now largely been supplanted by higher-capacity rolling stock and, in some markets and for some commodities, cars with a maximum gross weight of 315,000 pounds are permitted. Railcars that can accommodate these higher weights offer more cost-effective transportation of dense bulk products, such as coal, benefiting the shippers and receivers and, the consumers of products made with the shipped materials. With coal being the primary commodity handled across West Virginia's rail network, most of the State's rail lines can accommodate 286,000-pound railcars.²⁸ Nevertheless, to ensure the ongoing economic vitality of West Virginia's rail network, the State should set a goal of ensuring that all rail lines meet the 286,000-pound minimum standard.

- **Track conditions.** The Federal Railway Administrators (FRA) has established minimum track safety standards requirements and maintenance levels for railroad operators, which dictate the minimum conditions that are allowable for train operations at given operating speeds. Rail lines of higher FRA track classification are typically in better condition than rail lines with lower FRA track classification. If a line is not maintained sufficiently for trains to operate at the specified track class, then either temporary or permanent operating restrictions ("slow orders") must be placed on the tracks, or the track class downgraded to a lower level that is consistent with actual conditions. Thus, the combination of track class and mileage with slow orders imposed are a strong indicator for the physical condition of the rail system. Most of West Virginia's rail system is maintained at FRA Track Class 2 (25 miles per hour (mph) maximum for freight) and Track Class 3 (suitable for freight train speeds up to 40 mph). The only mileage maintained at Track Class 4 (60 mph maximum for freight, 79 mph for passenger) hosts Amtrak's Capitol Limited and Cardinal long-distance train services.
- **Bridges.** Railroad bridges are built, designed, and maintained by the carriers. Long-lived and capital intensive, they are critical to the efficiency and productivity of the rail network and are often the cause of weight and clearance restrictions along a particular route. This is particularly the case with West Virginia, with its rugged topography and high density of bridge structures, as is shown in Figure 37.
- **Vertical clearance** affects the efficiency of moving rail freight across the country, particularly intermodal. By carrying two intermodal containers stacked one on top of the other on a single rail car (i.e., "double stacking"), railroads can improve the economics of handling intermodal freight through reduced capital costs with rolling stock, main lines and terminals, along with substantial increases in operating efficiency. For this reason, North America's primary high-volume main lines have been adapted to accommodate double-stack traffic. Presently, several main routes have been cleared for double-stack service in West Virginia, most notably the CSX route linking Baltimore, Maryland with Pittsburgh, Pennsylvania through Martinsburg, West Virginia, and the NS route connecting the tidewater region of Virginia and Ohio through Bluefield and Kenova. Beyond the lines that presently handle intermodal traffic, the need for additional double-stack cleared routes has not been examined.

²⁸ 2020 West Virginia State Rail Plan, p. 121, <https://transportation.wv.gov/rail/2020WVSRP/Documents/WVSRP-2020.pdf>.

Figure 37. West Virginia Freight Rail Bridges



Source: 2020 West Virginia Rail Plan.

Safety

Safety is of central importance to the State of West Virginia, particularly given the considerable volume of hazardous materials, including chemicals, which are



Safety Trends



of 143 trespassing incidents recorded from 2011 to 2021 resulted in a fatality

2021



In 2021 there were approximately 75 hazardous material incidents

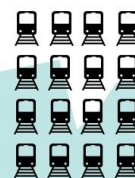
Each  represents 10 incidents involving hazardous materials

2022



In 2022 there were approximately 45 hazardous material incidents

2020



2022



At-grade crossing collisions were down 23% in 2022 compared to 2020

Each  represents 10 at-grade crossing incidents



of rail-related fatalities involve at-grade crossings or railroad track trespassing

transported by rail.²⁹ West Virginia's Public Service Commission conducts track and equipment inspections, operating practices, signal and train control inspections, and hazardous materials inspections. These state officials coordinate with FRA to ensure the safety of the State rail network.

National rail safety metrics have improved in recent years, with the incident rate for all railroads declining by 44 percent since 2000, and hazardous materials incidents down by 78 percent. The frequency of incidents in West Virginia has paralleled national trends since 2000, with less than 20 average annual incidents since 2011. Railroads continue to maintain a strong safety record through technological investments, equipment maintenance, and a strong safety commitment from their employees.³⁰

The safety of hazardous material movement over the rail system is overseen by the U.S. DOT, U.S. Department of Homeland Security (DHS), and U.S. Pipelines and Hazardous Materials Safety Administration (PHMSA). Safety measures include design standards for all cars carrying hazmat, mobile apps to facilitate safety information for first responders, and a route evaluation software for determining the safest and most secure rail routes. According to the Association of American Railroads (AAR), more than 99.9 percent of rail hazmat shipments reach their destination with no release of hazardous materials caused by train accident. In general, the frequency and cost of hazmat incidents in West Virginia is consistent with national trends, although the State retains a disproportionate share of such incidents. This is due to the presence of several major chemical plants, as most incidents occur when railcars are either being loaded or unloaded.

A critical safety risk for railroads and one of the leading causes of fatalities involving railroads are highway-rail grade crossings. Trains have priority at highway-rail grade crossings, principally due to the physical operating characteristics of rail rolling stock, which entail long stopping distances. Therefore, highway-rail grade crossings include a range of safety systems. At minimum, they must be equipped with passive warning devices, such as railroad crossing signage and pavement markings. Crossings with higher volumes of highway traffic also are equipped with active warning devices, ranging from flashing lights to various types of gate configurations.³¹

West Virginia has 3,753 highway-rail crossings, and slightly more than half involve public roadways (1,882). The majority (3,114) of these highway-rail crossings are at-grade, while a smaller percentage are crossings where the railroad passes over or under the roadway. Most of the crossings involve roads; however, a handful exist for pedestrian pathways (48) and at stations (3).³² West Virginia has made substantial gains in reducing statewide train-vehicle incidents at highway-rail grade crossings. From a high of 111 incidents resulting in eight deaths at highway-rail grade crossings in 1980, West Virginia achieved a low of 13 incidents with no fatalities in 2021.

²⁹ West Virginia 2020 Rail Plan.

³⁰ [Freight Rail Safety Record | Association of American Railroads \(aar.org\)](https://www.aar.org/freight-rail-safety-record).

³¹ [AAR-Grade-Crossing-Safety-Fact-Sheet.pdf](https://www.aar.org/aar-grade-crossing-safety-fact-sheet.pdf).

³² <https://data.transportation.gov/Railroads/Crossing-Inventory-Data-Current>.

3.4 Ports and Waterways

The waterway freight system in West Virginia plays a crucial role in supporting the State's economic health and resiliency, as well as contributing to the Nation's supply chain. The waterway freight system promotes sustainability by reducing energy usage and air emission per ton of freight moved, and improved system resiliency through redundancy. The rivers, bays, coasts, lakes, and channels across the country make up a versatile network consisting of more than 25,000 nautical miles of navigable waterways.³³

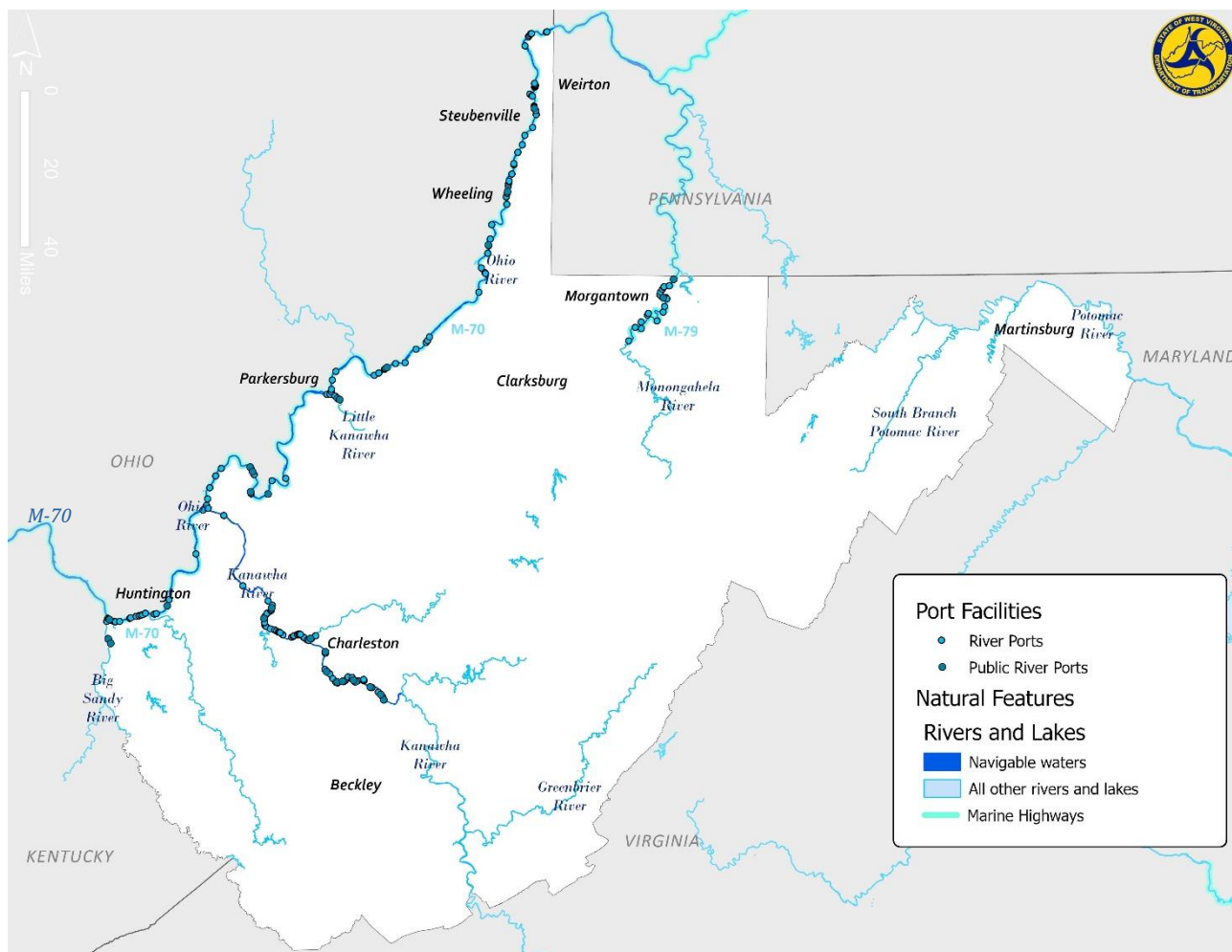
The port system in West Virginia is made up of two major ports—Port of Huntington Tri-State and Mid-Ohio Valley Statistical Port District, three navigable waterways (Ohio, Kanawha, and Monongahela Rivers), 197 marine terminals, and 13 locks and dams as shown in Figure 38. This network connects various regions, facilitating efficient transportation and trade across the country. The Nation's inland waterway system or marine highway network provides opportunities for freight services for the country and connects port facilities.

The waterway freight system is managed by the WVDOT's Division of Multimodal Transportation Facilities and overseen by the U.S. Army Corps of Engineers (USACE) under the Rivers and Harbors Act to ensure the smooth operation and management of port-related data and maintenance. West Virginia marine highway routes are designated under route M-70 which include the Ohio, Mississippi, and Missouri Rivers.

Morgantown Monongalia MPO is sponsoring a proposal for the Monongahela River to be designated as part of the Federal Marine Highway System (U.S. Marine Highway Program) as Marine Highway 79. The Port of Pittsburgh and the City of Morgantown have worked together to develop the application and the Morgantown Monongalia MPO is co-sponsoring the application.

³³ U.S. DOT Maritime Administration, [United States Marine Highway Program | MARAD \(dot.gov\)](#).

Figure 38. West Virginia Statewide Port and Inland Waterways Facilities



Source: <https://gis.transportation.wv.gov/ports>.

The port and inland waterway system supports 138,200 jobs within the State and contributes to the nation's supply chain with the ability to meet consumer needs.³⁴ The port and inland waterway system alleviates landside congestion, easing the burden on highways and reducing the wear and tear of surface transportation infrastructure. Furthermore, it increases the overall capacity of the freight system, allowing for the smooth movement of goods and materials.

³⁴ https://www.waterwayscouncil.org/file/302/HO_WaterwaysProfile_WV.pdf.

3.4.1 Ports and Waterways Demand

Ports, waterways, and locks and dams are classified by the USACE Waterborne Commerce Statistics Center (WCSC), defined as follows:

- Ports** are designated area where a ship can transfer cargo and each year the WCSC identifies the top 50 water ports in the U.S. by tonnage. The Mid-Ohio Valley Port was ranked 17th nationwide by tonnage and 14th by dry bulk served in 2020 according to the USACE, and the Port of Huntington Tri-State was ranked the 22nd largest port in the U.S. by tonnage served and the 7th largest by dry bulk transported.
- Navigable Waterways** are bodies of water that move with the ebb and flow of the tide and are used for the transportation of Interstate or foreign commerce.³⁵ The three commercially navigable waterways in West Virginia are the Ohio, Kanawha, and Monongahela Rivers. The Ohio River has 99 marine terminals, the Kanawha River has 68 and the Monongahela River has 15. All three waterways operate year-round.
- Locks and Dams** are engineered structures that control waterborne movements on rivers, canal waterways. Locks raise and lower boats, while a dam serves as a barrier that controls the flow of surface water or underground streams. All of the locks and dams in West Virginia are owned, operated, and maintained by the USACE Pittsburgh District and Huntington District. Of the 13 locks and dams, seven are located on the Ohio River, three on the Kanawha River, and three on the Monongahela River.



PORTS & WATERWAYS

72 MILLION TONS VALUED AT \$4.1 BILLION IN 2019
PROJECTED TO DECLINE TO 20.4 MILLION TONS
VALUED AT \$2.8 BILLION BY 2050

Total Commodities by Weight 2019		Total Commodities by Value 2019	
Coal	62.3 M	Coal	\$2.73 B
Gravel	6.5 M	Crude Petroleum	\$387 M
Crude Petroleum	1.25 M	Natural Gas and Fossil Products	\$290 M

According to the National Waterways Foundation, the Nation's inland waterway system handles approximately 624 million tons of waterborne cargo, with a total value of \$70 million, making a significant contribution to the national economy. Inland waterway movement is particularly advantageous for transporting the country's energy commodities. Nationally, the largest commodity by weight transported on the waterways is petroleum followed by coal, as seen in Figure 39.

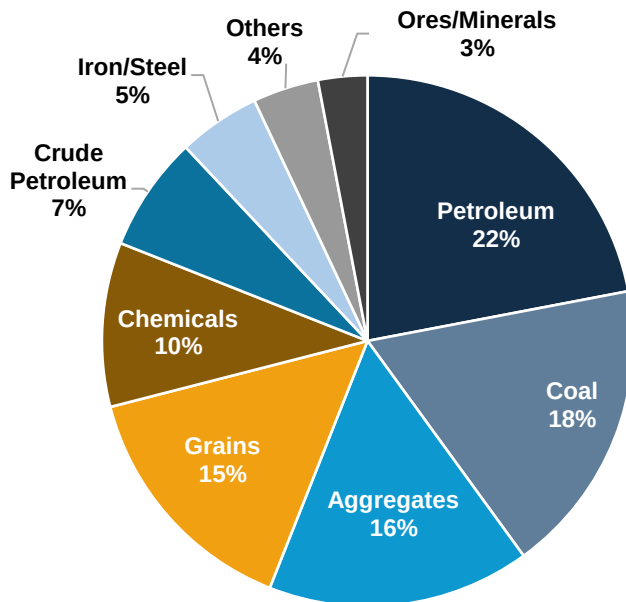
In 2019, 72 million tons moved via West Virginia's inland waterways; however, the FAF version 5.4.1 (FAF5), indicates a downward trend in waterborne freight activity in the coming decades. Waterborne freight activity is expected to decrease by 72 percent in terms of tonnage from 2019 to 2050. The value of this tonnage is projected to decline by 32 percent from 2019 to 2035 and remain at this level until 2050. Energy products accounted for over 80 percent of waterborne commodities in 2019 and is predicted to account for 46 percent of waterborne commodities in 2050.

Inbound commodities are projected to decrease seven percent from 2019 to 2050 and decrease by 10 percent from 2019 to 2035. However, value of tonnage is projected to increase by 43 percent from 2019 to 2050 and by 17 percent from 2019 to 2035. Outbound tonnage is project to decrease by 84 percent from 2019 to 2050. Outbound tonnage value also is projected to decline by 43 percent from 2019 to 2050. In 2019, Ohio was the top inbound trade partner, accounting for 38 percent of the total tonnage and 46 percent

³⁵ <https://www.nap.usace.army.mil/Portals/39/docs/regulatory/regs/33cfr329.pdf>.

of the total value. Looking ahead, Indiana is projected to become West Virginia's primary trading partner in terms of tonnage, representing 36 percent of the total volume. In terms of value, Texas is predicted to account for 61 percent of the total value.

Figure 39. U.S. Inland Waterway Traffic by Commodity, 2019



Source: *Waterborne Commerce Statistics 2019.*

Note: *Does not include lake or coastal waterway traffic.*

3.4.2 Infrastructure Condition and Performance

Flooding within West Virginia is anticipated to have a significant impact on the aging port infrastructure of the State. According to West Virginia University, from January 2007 to March 2022 there were 1,683 floods throughout the State, and since the catastrophic 2016 flood, the State has experienced 968 floods, resulting in 34 lives lost and causing \$54 million in damages.^{36,37} The increase in floods has been correlated to an increase in greenhouse gases and warmer temperatures making West Virginia one of the most flood prone states in the Nation.

Flood can impact barge traffic on navigable waterways. In 2019, hundreds of barges were stalled on the Mississippi River due to flooding impacts, causing barge halts throughout the region in the Arkansas River, the Illinois River, and the Ohio River.³⁸ High water levels as the result of flooding on navigable waterways causes freight carrying barges to be held at locks until the waterways become manageable for freight movement. The inability for barge traffic to move due to flooding will force grain and fertilizer shipper to find alternative, potentially more costly, transportation options via other freight transportation modes.³⁹ These

³⁶ A flood that hit on June 23, 2016, resulted in 23 deaths making it one of the deadliest floods in West Virginia history.

³⁷ <https://wvpublic.org/w-v-a-among-most-flood-susceptible-in-Nation/>.

³⁸ <https://www.supplychainbrain.com/articles/29816-punched-in-the-face-us-floods-snarl-trucks-trains-barges>.

³⁹ <https://www.reuters.com/world/us/flooding-upper-mississippi-river-halt-barge-traffic-weeks-usda-2023-04-27/>.

impacts to shipping by barge throughout the region continues to be a critical issue. Due to the increasing urgency of flooding and its impacts on ports and waterways infrastructure, Senate Bill 677 was signed into law in March of 2023, providing support for a new state flood resiliency plan as well as \$40 million to the Flood Resiliency Trust Fund to invest in infrastructure projects that provide flood resiliency to communities throughout the State.

WVDOT's Division of Multimodal Transportation Facilities is responsible for helping private and public entities in developing and operating proposed public port and intermodal facilities throughout West Virginia. As such, they provide an inventory of the states 190 docks which comprise the Port of Huntington Tri-State and the Mid-Ohio Valley Statistical Port District. Currently, there is no publicly available data on the infrastructure and capital improvement needs of the two major port districts within the State. Due to the lack of publicly available data this section will discuss potential infrastructure and capital improvement opportunities for the proposed Port of West Virginia as well as funding opportunities from the Federal Government to help boost capital improvement projects.

Waterways performance between 2010 and 2020 on West Virginia's waterways varies by river:

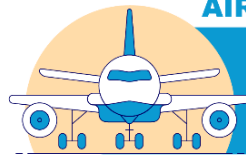
- **Ohio River.** Longest average delay was recorded in 2018 at over 2 hours and 50 minutes, and the longest average processing time was recorded in 2019 at nearly 55 minutes. There has been a decrease in vessels and lockages/cuts along the Ohio River since 2010 with the lowest number of vessels (84,633 vessels) and lockages/cuts (81,404 lockages/cuts) in 2020.
- **Kanawha River.** Longest average delay was recorded in 2012 at 1 hour 55 minutes, and the longest average processing time was recorded in 2015 at just below 1 hour. There has been a decrease in vessels and lockages/cuts along the Kanawha River since 2010 apart from 2015 when there was a slight increase at 6,011 vessels and 8,260 lockages/cuts.
- **Monongahela River.** Longest average delay was recorded in 2016 at 55 minutes, and the longest average process time was in 2019 at 56 minutes. There has been a decrease in vessels and lockages/cuts along the Monongahela River since 2010 with the lowest number of vessels (19,439 vessels) recorded in 2018, and the lowest recorded lockages/cuts (16,965 lockages/cuts) in 2020.

Dredging helps remove sediments and debris from the bottom of lakes, rivers, harbors, and other water bodies and is essential in the maintenance of the Nation's waterways. The process of dredging is required to help upkeep waterborne traffic due to the natural process of how sand and silt settle underwater. Dredging impacts the channel depth of waterways and helps ensure that they are deep enough for waterway freight movement. Pittsburgh District maintaining the largest volume of dredging from 2017 to 2022, and the Huntington District accounting for the largest volume of anticipated dredging in 2022 at 479,000 cubic yards.

3.5 Air Cargo

Aviation is critical to West Virginia's economy and its residents' way of life. While only a small amount of goods (31,000 tons, valued at \$886 million) moved to and from the State via air cargo, access to air cargo is critical for the State's industries and residents. Commodities moving via air are primarily high-value, low-weight goods such as small machinery or precision instruments. Air cargo also is increasingly important for the growing consumer and ecommerce economy focused on package shipments. Shippers and expedited carriers such as Amazon, UPS, and FedEx often use air cargo for at least part of a shipment's journey.

As there are no large cargo airports within the State (see Figure 21 for the location of the State airports that handle air cargo), much of the air cargo moving through West Virginia may travel part of its journey via truck to airports in surrounding states, such as Baltimore (BWI), Washington-Dulles (IAD), or Cincinnati (CVG). However, there are five airports within West Virginia that handle small amounts of air cargo, either as belly cargo on passenger aircraft, or via dedicated carriers such as FedEx feeder service. The five airports with air cargo service include:



AIR CARGO

31 THOUSAND TONS VALUED AT \$866M IN 2019
PROJECTED TO GROW TO 118 THOUSAND TONS
VALUED AT \$2.9 BILLION BY 2050

Top Commodities by Weight 2019		Top Commodities by Value 2019	
Mixed Freight	20.6 K	Machinery	\$210 M
Machinery	2.4 K	Mixed Freight	\$155 M
Plastics/ Rubber	1.6 K	Precision Instruments	\$110 M

- **Huntington Tri-State Airport (HTS)**, located about six miles southwest of Huntington, WV, near the border of Kentucky and Ohio. Multiple passenger airlines serve HTS. FedEx handles almost all freight at HTS, about 3,500–4,000 tons enplaned annually.
- **Beckley Raleigh County Memorial Airport (BKW)**, located about four miles east of Beckley, WV. Limited charter flights are available. FedEx is the primary freight operator, handling up to 200 tons enplaned annually.
- **North Central West Virginia Airport (CKB)** located six miles east of Clarksburg, WV. Passenger service to CKB was stopped during the COVID-19 pandemic. A minimal amount of freight, about 25 tons, is enplaned annually.
- **Greenbrier Valley Airport (LWB)** located four miles northeast of Lewisburg, WV. Passenger service to LWB was stopped during COVID-19, but charter service was begun in 2022. Up to 15 tons of freight are enplaned at LWB annually.
- **West Virginia International Yeager Airport (CRW)**, located about three miles northwest of Charleston, WV. A range of passenger carriers serve CRW. Up to 100 tons of freight are enplaned at CRW annually.

The air cargo industry continues to evolve in recent years. The COVID-19 pandemic is one recent example that fundamentally shifted how people work, as well as buy and sell goods. Both passenger and freight air service were significantly altered in response. Aircraft and airport technology also is changing at a rapid pace. As passenger carriers transition out their older fleet for newer, more fuel-efficient aircraft, many of these aircraft are being converted to freighters. The rise of Unmanned Aerial Systems (UAS), technology also is increasingly impacting all aspects of the aviation industries and are projected to become a larger part of the industry over time, both in West Virginia and nationwide.

The infrastructure capacity (runways, taxiways, etc.) at and connecting to West Virginia airports is sufficient to handle existing and future demand for air cargo operations. WVDOT should continue to work with its local partners to identify opportunities to enhance economic development at or near airports to support the State's economy. For example, the WVDOT could play a role in maintaining roadway infrastructure to ensure efficient connections to airport facilities, supporting deployment of technology to enhance cargo operations, and developing policies to promote effective use of UAS technology within the State.

3.6 Pipelines

Pipelines provide the safest mode for moving liquid energy commodities through a system of pipes, production areas, and storage facilities. Natural gas was one of the main commodities moving through the U.S. pipeline network in 2021, followed by liquid petroleum (oil), and liquefied ethylene, propane, butane, and some petrochemical feedstock.⁴⁰ In 2021, U.S. natural gas exports reached a record high and allowed natural gas production to exceed domestic consumption. Contribution to this growth of natural gas in the U.S. is the extraction of shale gas. The production of shale grew exponentially after 2008 due to the combination of hydraulic fracturing and horizontal drilling, which has increased the efficiency of energy production in the U.S. and in particular, West Virginia.⁴¹

According to the U.S. Energy Information Administration (EIA), horizontal hydraulic fracturing accounts for nearly 70 percent of the existing wells in the U.S. Since the early 2000s, horizontal drilling has become the dominant method of accessing natural gas in the U.S. because drilling horizontally underground allows for more access to oil and natural gas-bearing rock than drilling vertically. The increased efficiencies of extracting natural gas have allowed for higher production despite the number of existing wells remaining constant since 2005.

Energy production is one of the leading industries driving West Virginia's economy, and while historically coal has been the leading economic force, in 2019 natural gas surpassed coal to become the largest driver of the State's energy economy. West Virginia has become an important player in the U.S. energy industry and currently is the fourth-largest energy producer in the Nation. Currently, well over 80 percent of the pipelines in West Virginia move natural gas.⁴²

Pipelines are a critical piece of infrastructure for the West Virginia economy, transporting the State's high-value energy commodities. Figure 40 shows the major operators in the State, with Columbia Gas Trans Co. operating over 54 percent of the State's 3,288 miles of operating and mapped pipelines. Most liquid natural gas deliveries outside of pipelines require Class I freight rail to transport commodities to markets in nearby states or to liquid natural gas terminals. In West Virginia, dry gas is not transported outside of the existing pipeline network. As a result, there are no planned pipeline terminal projects in West Virginia due to the enhanced efficiency of pipelines for the movement of natural gas out of the State.⁴³ However, to support pipeline construction in West Virginia, the Building American Energy Securities Act of 2023 seeks to set maximum timelines for National Environmental Policy Act (NEPA) reviews, address excessive litigation delays, and prioritize infrastructure projects of national importance.⁴⁴ This initiative would support the completion of the Mountain Valley Pipeline (MVP) which had been paused indefinitely due to permitting regulations. However, on June 3, 2023, the President of the United States signed legislation that raises the Nation's debt limit and ratifies and approves all permits and authorizations necessary for the construction and initial operation of the MVP and directs the applicable Federal officials and agencies to maintain such

⁴⁰ <https://www.phmsa.dot.gov/faqs/general-pipeline-faqs>.

⁴¹ <https://www.strausscenter.org/energy-and-security-project/the-u-s-shale-revolution/#:~:text=The%20E2%80%9CShale%20Revolution%E2%80%9D%20refers%20to,total%20U.S.%20crude%20oil%20production>.

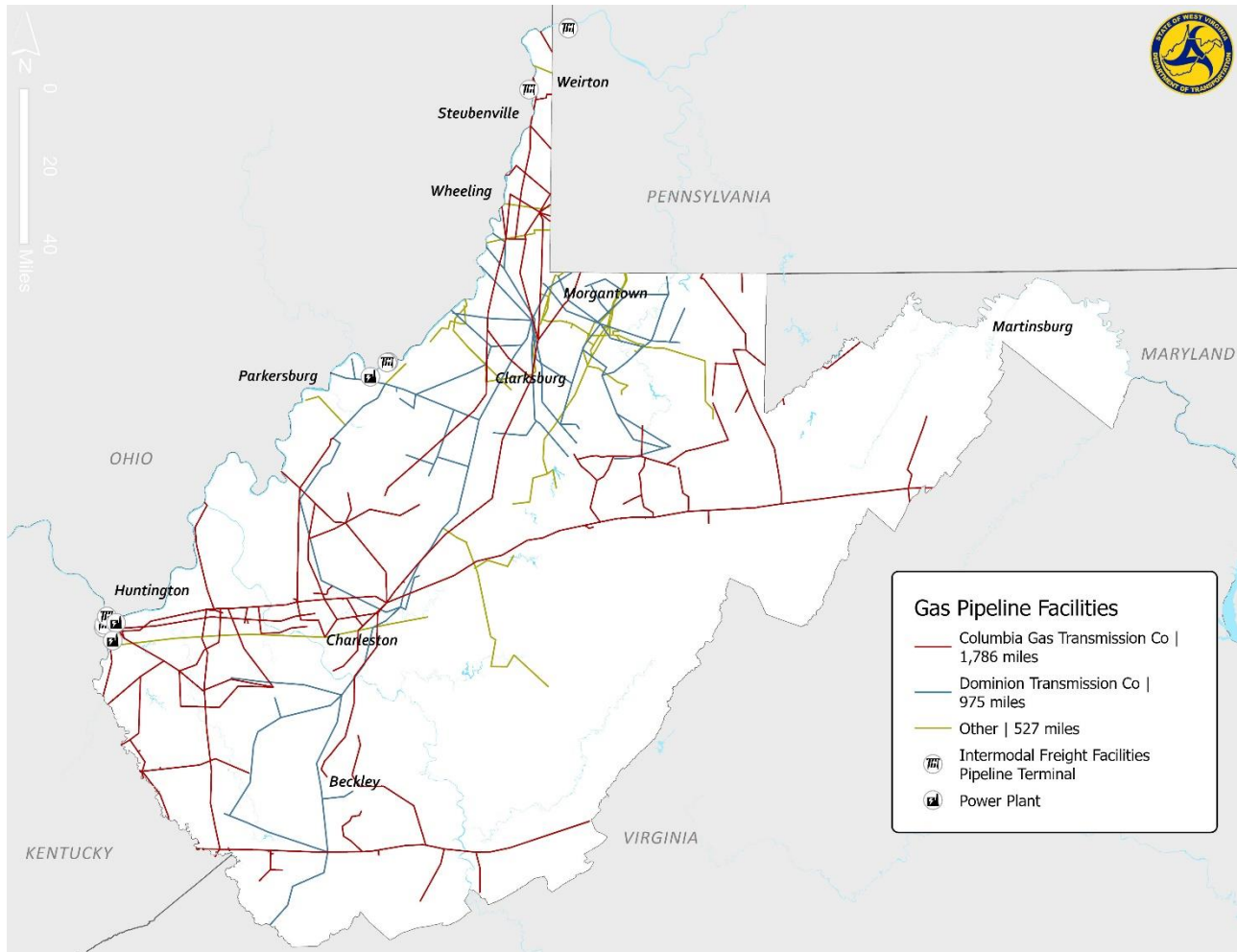
⁴² FHWA FAF5 (2019–2050), disaggregated by Cambridge Systematics, Inc.

⁴³ [North American LNG Export Terminals—Existing, Approved not Yet Built, and Proposed | Federal Energy Regulatory Commission \(ferc.gov\)](https://www.ferc.gov/north-american-lng-export-terminals-existing-approved-not-yet-built-and-proposed).

⁴⁴ <https://www.energy.senate.gov/2023/5/manchin-moves-ball-forward-on-permitting-reform>.

authorizations. On June 24, 2023, the Secretary of the Army issued all permits necessary to complete project construction and allow for MVP's operation and maintenance. Equitrans Midstream, operator of the MVP, intends to work with its project partners to complete construction of the MVP project by year-end 2023, at an estimated total project cost of approximately \$6.6 billion.⁴⁵

Figure 40. West Virginia Natural Gas Pipeline Ownership by Mile

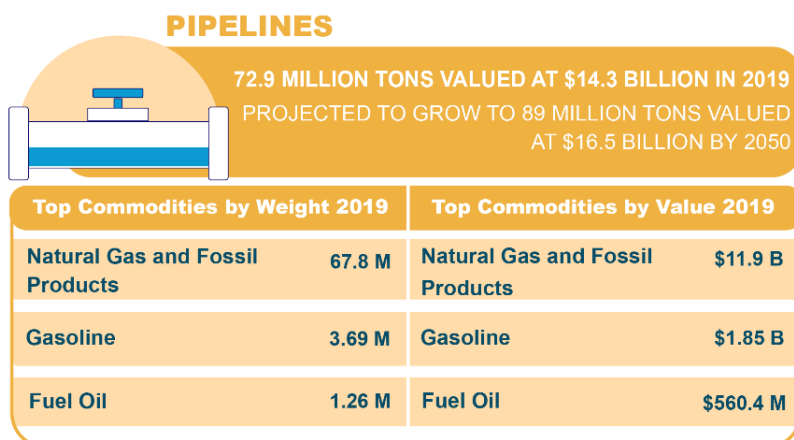


Source: <https://hifld-geoplatform.opendata.ArcGIS.com/datasets/natural-gas-pipelines/explore?location=34.538302%2C-109.077389%2C3.77>.

⁴⁵ <https://www.mountainvalleypipeline.info/news-info/>, accessed June 19, 2023.

3.6.1 Pipeline Demand

In 2019, nearly 73 million tons valued at \$14.3 billion flowed throughout West Virginia's pipeline network. Overall, pipelines represented 22 percent of the State's total volume of freight movement for all modes and 11 percent of the total value. The largest proportion of movement by volume and value was domestic outbound flows, which accounted for 77 percent of total volume and 67 percent of total value. West Virginia's top outbound pipeline trade partners for 2019 include Ohio, who accounted for half the volume and value, followed by Virginia at 21 percent of volume and value, Pennsylvania at 15 percent of volume and value, and Kentucky at 13 percent of volume and value.



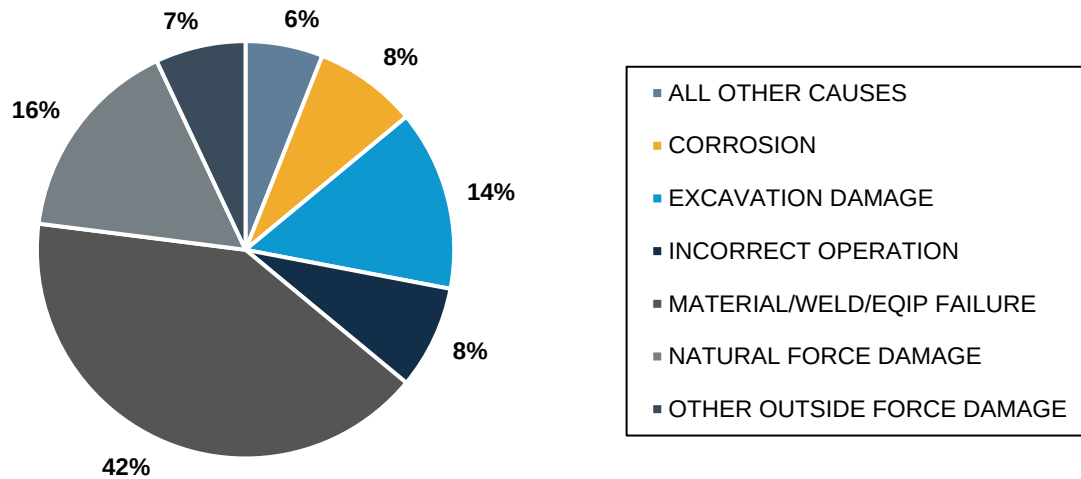
There are four types of commodities that flow throughout West Virginia via pipeline. Natural gas and fossil products accounted for 93 percent of the total pipeline tonnage and 83 percent of total value.⁴⁶ Gasoline accounted for 5 percent of the volume and 13 percent of value. Demand for natural gas within West Virginia is primarily driven by commercial and residential electricity; however, West Virginia is in the bottom 10 states using natural gas for electricity production because coal accounts for 90 percent of the generated electricity within the State. Pipeline capacity in the U.S. currently is estimated at 300 billion cubic feet per day, and according to FAF5, pipeline flows are expected to increase by 22 percent by tonnage from 2019 to 2050.

3.6.2 Pipeline Safety

West Virginia's pipeline network is regulated by PHMSA which ensures the safety standards of the pipeline network. According to PHMSA, there were 88 recorded incidents in West Virginia from 2003 to 2022. As shown in Figure 41, the two major causes of incidents were equipment failure and natural forces. Equipment failure includes causes such as construction, installation related failures, malfunction of equipment, nonthreaded connection failure or pump compressor related failures. Natural force damage can include earth movement, heavy rains and floods, and lightning.

⁴⁶ Commodities in this group include liquefied natural gas, propane, butane, and other liquefied gaseous hydrocarbons that can be transported in pipelines.

Figure 41. Significant Incident Cause, 2003–2022



Source: U.S. Energy Information Administration.

In West Virginia, gas transmission has had the most reported incidents (66 percent), followed by gas distribution (19 percent) and hazardous liquid accidents (12 percent). Overall, West Virginia accounted for fewer than 5 percent of the reported pipeline incidents in the U.S. for the past 20 years with a total of 88 incidents, 7 fatalities, 9 injuries and \$55 million in total cost reported.⁴⁷ Continued data utilization by PHMSA to help optimize safety standards for the safe movement of our energy sources will be critical to maintaining and improving pipeline safety standards in West Virginia and the greater U.S.

⁴⁷ As used in pipeline safety regulations, an incident is an event occurring on a natural gas pipeline for which the operator must make a report to the Office of Pipeline Safety. Events of similar magnitude affecting hazardous liquid pipelines are considered accidents. (Reference 49CFR 191.3, 49CFR 195.50).

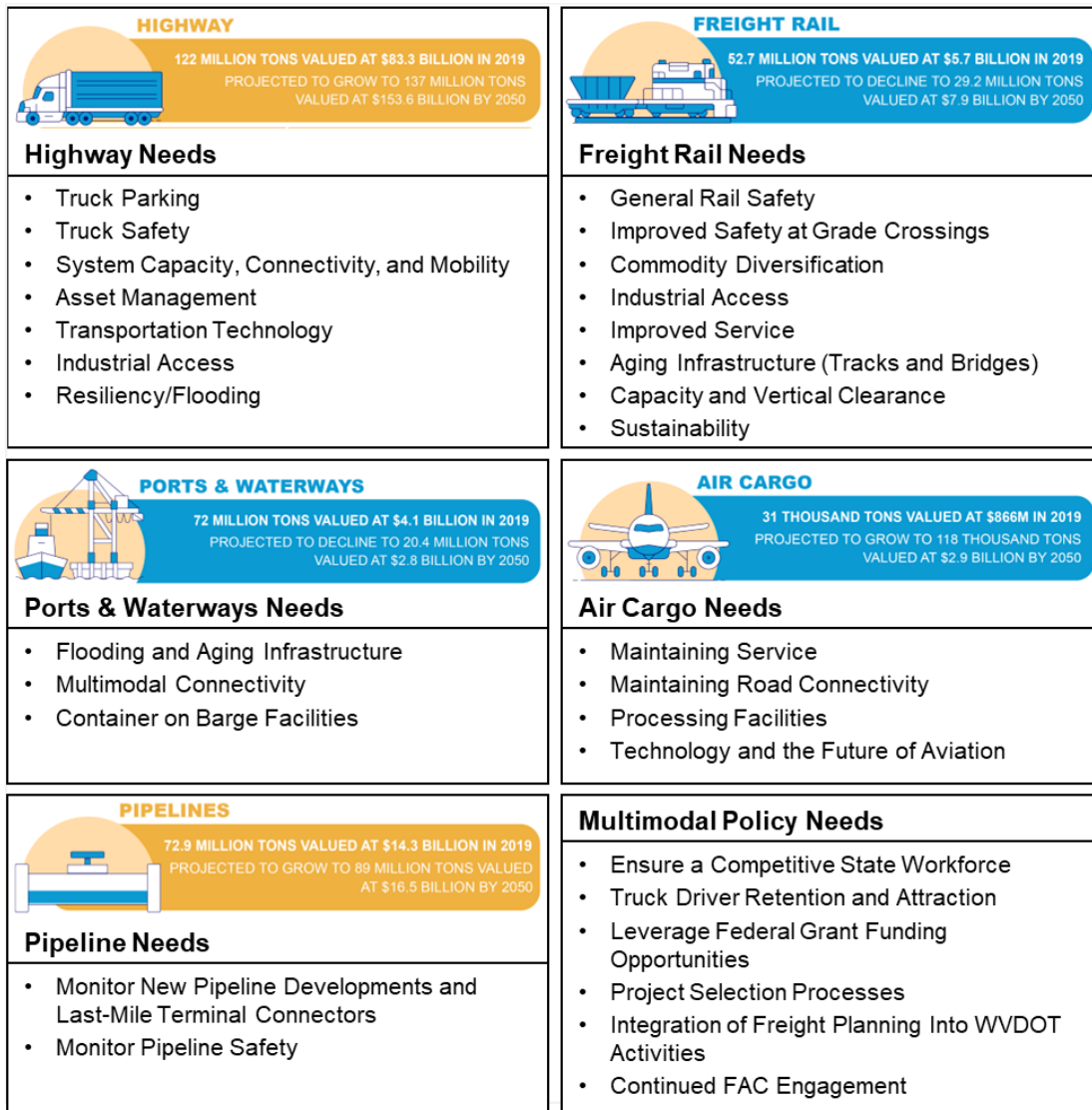
4.0 WV'S FREIGHT CHALLENGES AND OPPORTUNITIES

What are our current and future multimodal needs? ♦ Where are the most important gaps and opportunities? ♦ What are the impacts in terms of equity and the environment? ♦ How do we measure and track performance?

4.1 Needs on the WV Multimodal Freight System

The needs of West Virginia's multimodal freight system are informed through the trends in Section 2.0, the system profiles in Section 3.0, stakeholder engagement, and insights from recent statewide, regional, and local plans and programs. These needs include the infrastructure, operations, policy, and funding for each transport mode as highlighted in Figure 42.

Figure 42. WV Multimodal Freight System Needs Summary



4.1.1 Highway Needs

For the West Virginia highway system, the following needs were identified:

- Truck Parking.** Truck parking was acknowledged by stakeholders as a general need and represents a significant safety issue. Approximately two-thirds of all designated truck parking facilities, including publicly owned, are approaching or over capacity during peak periods. Data analysis found that Districts 5, 1, 10, 6, and 3 (in order of priority) have the greatest need for additional parking spaces. Additional parking also is needed along targeted corridors, including I-70, I-81, I-64, I-79 and U.S. 52. Stakeholders also shared that there are insufficient turning radii at parking sites, a need for staging areas outside of urban areas, and extensive truck parking infrastructure degradation from fracking trucks. The lack of truck parking, as well as limited wayfinding, dynamic messaging, and real-time truck parking availability technologies, including for emergency weather events, collectively should be addressed to further support truck drivers and enhance safety. As noted by the Brooke Hancock Jefferson Metropolitan Planning Commission (BHJ MPC), truck parking siting can also be challenging, as environmental clean-up of brownfields for truck parking use makes the land highly valuable for other uses.
- Truck Safety.** Safety is a high priority for WVDOT. In West Virginia, there were 518 fatal and serious injury crashes involving trucks between 2017 to 2021, an average of about 104 truck-involved crashes per year. The prevalence of single vehicle crashes may be related to factors such as roadway alignment and excessive speed. Angle crashes may be due to many factors, including excessive speed, drivers not obeying traffic signals, and poor visibility of traffic signals due to the prevalence of large trucks. Generally, fatal and serious injury truck-involved crashes primarily occurred in West Virginia's most populous counties. Kanawha County experienced the largest share of fatal or serious injury truck-involved crashes with about 11 percent. In addition, stakeholders suggested that a lack of enforcement of oversize/overweight loads is an issue, given the likelihood of expired permits, and an increase in heavy truck traffic to support the oil and shale industry. Other key safety issues relate to difficulties in navigating tight turns along narrow urban streets, especially when other cars are present on the street.

Other notable safety issues exist related to tourism traffic, particularly in the Fayette/Raleigh MPO area; U.S. 19 is one corridor of concern due to increased truck and tourism traffic as result of the designation of New River Gorge National Park and Preserve in 2021. Some corridors have challenging topography and geometry that create safety risks, including a portion of I-64 which has a 7 percent grade, east of the New River Gorge Bridge along U.S. 19, the intersection of U.S. 19 and WV-612, and WV-7 along Hogback Ridge.
- System Capacity, Connectivity, and Mobility.** West Virginia's highway network experiences capacity and connectivity issues that hinder freight mobility. The WV Department of Economic Development noted that WV-2 from Huntington to Chester, paralleling the Ohio River, remains a key bottleneck. In some locations, such as near Apple Grove, Mason County (near the new Nucor facility), Ravenswood, Jackson County and Weirton, Hancock County, additional lanes may be needed when new development occurs. Additional infrastructure needs include the completion of the Coalfields Expressway that will address existing roadway condition and safety needs and support economic development in Wyoming and McDowell Counties, and the potential need to widen I-79.

Currently, the Eastern Panhandle is experiencing significant residential and economic growth, and there are several locations which may require infrastructure upgrades to accommodate growth, including U.S. 11, WV-9 between Martinsburg and Hedgesville, and the WV-9 at U.S. 340 interchange in Charles Town. U.S. 119 through Morgantown also continues to be a chokepoint, which creates numerous problems within the downtown and adjacent underserved communities. The completion of Corridor H

from Elkins to the Virginia State line near Wardensville is needed to enhance safety for trucks and passenger vehicles, and increase regional economic development and tourism.

- **Asset Management.** Asset management needs include West Virginia's bridge and pavement assets, which, as documented in the TAMP, comprise nearly two-thirds of total statewide transportation needs and represent a significant investment. About one quarter of West Virginia's roadways exhibit poor pavement conditions indicating that they are in need of rehabilitation in the near or immediate future. A reduction in coal extraction combined with stabilized oil and gas operations may lead to reduced wear and tear on NHS roadways over time, however this will also result in reduced motor vehicle fuel tax collections, ultimately reducing revenues. Maintaining long-term pavement conditions requires adaptive funding and treatment methodologies.

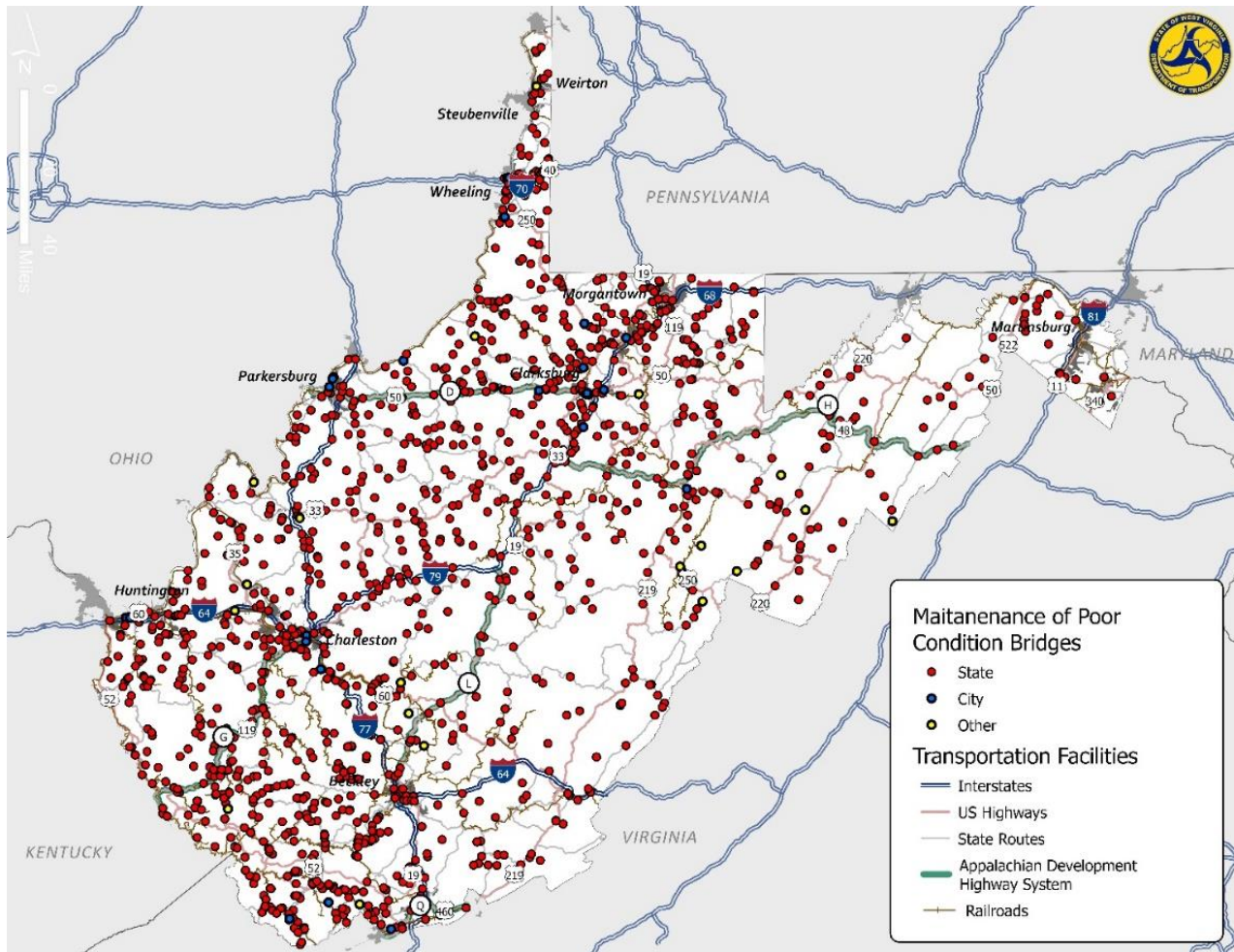
Bridge condition is considered a more vital need for rural areas as opposed to urban areas, with some stakeholders noting that increased damage to local rural roads has occurred from trucks associated with fracking activities; oil and shale trucks can spill sands on highways, which leads to increased asphalt degradation. In Morgantown, a large portion of the truck traffic traversing the Pleasant Street Bridge are carrying nearly 90,000 pounds of aggregates and other materials and per local stakeholders, believe it is likely causing increased deterioration of the highway and bridge. In Westover, similar activities have resulted in damage to water and sewer lines. The WWW MPO has noted a need to upgrade roadway infrastructure to support heavier truckloads in areas where manufacturing growth is anticipated, such as South Parkersburg and Mineral Wells. A map of bridges in poor condition are shown in Figure 43.

- **Transportation Technology.** The continued development and deployment of emerging technologies such as connected and automated vehicles (CAV), alternative commercial vehicle engine and fuel technologies, including hybrid and electric, and ITS will push the need for increased funding, research, and development. There is a need to explore opportunities for technology improvements, including temporary and permanent message boards, smart work zones and incident response, and communication between vehicles and infrastructure. There also is an opportunity for WVDOT to collaborate with MPOs and other state DOTs on the availability and placement of electric charging infrastructure for medium and heavy commercial trucks, including opportunities with National Electric Vehicle Infrastructure and the Charging and Fueling Infrastructure discretionary grant funding programs. WVDOT should explore current and future impacts of CAV technology on Interstate operations, including truck platooning and autonomous vehicle licensing and operation as specified in the 2022 Fully Autonomous Vehicles Act, and assess new delivery technologies and their potential to reduce trucks on local roads.⁴⁸
- **Industrial Access.** Industrial access can be a challenge for newly developed facilities located on portions of roadway not designed for freight-intensive activities, and was highlighted as a notable issue for BHJ MPC in particular. As an example, Form Energy's proposed new iron-air battery manufacturing plant in Weirton is expected to generate between 250 and 500 trucks per week.⁴⁹ Currently BHJ MPC is working with WVDOT to develop an access road to support those truck volumes. An additional access road also is needed in Weirton to access the area around Bidell Gas Compression, given challenges in accessing the facility via downtown Weirton during the daytime.

⁴⁸ WV Code 17H (<https://casetext.com/statute/west-virginia-code/chapter-17h-fully-autonomous-vehicles-act>).

⁴⁹ Form Energy (<https://governor.wv.gov/News/press-releases/2022/Pages/Gov.-Justice-announces-Form-Energy-will-site-first-American-battery-manufacturing-plant-in-Weirton.aspx>).

Figure 43. Location of West Virginia Bridges in Poor Condition



Source: FHWA, National Bridge Inventory, 2021; Cambridge Systematics, Inc. analysis.

- Resiliency/Flooding.** Flooding is a challenge that impacts not only port and waterway activities, but also surface transportation infrastructure in low-lying or flood-prone areas resulting in disruptions to freight and passenger mobility. Disruptions can impact all modes, and in the cases of extreme weather or excessive, prolonged flooding, disruptions can impact surface transportation assets in addition to facilities, businesses, and residents located in or near the waterways system. While it is impossible to predict the occurrence of extreme weather events, researchers indicate that they are likely to occur more frequently. This highlights the need for WVDOT, partner state agencies, and local agencies to collaborate on planning and constructing transportation improvements that are resilient. For West Virginia's freight highway system, this means ensuring that alternative truck routes that can be used in the event of an emergency are identified, maintenance of freight highway infrastructure is not deferred, and policy oriented towards integrating resiliency into decision-making is enacted.

4.1.2 Freight Rail Needs

For the West Virginia freight rail system, the following needs were identified:

- General Rail Safety.** Safety is of central importance to the State of West Virginia, particularly given the considerable volume of hazardous materials, including chemicals, that are transported by rail in the

State. Ensuring safety includes continued rail industry monitoring by West Virginia's Public Service Commission in conjunction with the FRA. It also entails engaging with pending regulatory initiatives, including proposed legislation (Railway Safety Act of 2023) which would enhance safety procedures for all trains carrying hazardous materials, support communities impacted by rail freight disasters, and invest in the next generation of rail safety improvements.

- Improved Safety at Highway-Rail Grade Crossings.** Beyond general rail safety, there is a need for West Virginia to improve safety at highway-rail grade crossings, which includes an increased need for grade separations where highway and/or rail traffic warrant. Highway-rail grade crossing incidents remain one of the leading causes of fatalities in the railroad industry, behind trespassing, accounting for about 30 percent of railroad-related fatalities. While West Virginia has one of the Nation's lowest highway-rail grade crossing incident frequencies, there remain opportunities to continue safety enhancement and process improvements. There are several examples of known locations for crossing improvements, including improvements over double tracked CSXT rail lines to improve rail capacity in the State. In South Charleston, Jefferson Road is a priority grade separation, and WVDOT and CSXT are coordinating on the design and construction of improvements to grade separate Jefferson Road at the entrance of South Charleston rail yard. This highway-rail grade crossing is located on a well-traveled local road and the increased rail maneuvers within the yard contribute to frequent roadway traffic stops. Stakeholders also noted a need regarding cooperation with the railroads regarding highway-rail grade crossing safety needs.
- Commodity Diversification.** Diversifying energy sources, declining industrial uses, and evolving environmental regulations have put West Virginia's freight rail system in a long-term decline, and placing a sizeable portion of its trackage at risk of abandonment. Stemming this trend requires developing new sources of traffic through a concerted and creative effort by involved stakeholders, including West Virginia's railroads, industry, and economic development agencies. Near-term prospects for carload and intermodal rail traffic include handling inbound and outbound materials associated with natural gas production from the Marcellus, Rogersville, and Utica shale formations, and increasing the presence in the State's strong chemicals sector. Longer term opportunities may be available by tapping growing freight-oriented industry such as the automotive sector, and expanding access to rail service through improved industry access for rail, transload facilities, and intermodal service. Successful development will depend on gaining a clear understanding of market opportunities, geographic and modal competition, and maintaining a level of cooperation among the involved parties.
- Industrial Access.** Similar to the challenges with industrial access discussed in the highway needs section, access to freight rail services can be a challenge for both newly developed facilities, as well as other sites without an existing rail spur or with underused and deteriorated rail infrastructure. Supporting public transload operations is a cost-effective method to provide access to rail service for shippers that either have no rail access, or who ship small volumes and cannot justify individual access. This need also is tied to the need to diversify commodities shipped on West Virginia railways, and may represent a potential strategy to leverage the rail network for further use.
- Capacity and Vertical Clearance.** At present, West Virginia's rail network has more than adequate physical capacity on its main lines, terminals and yards. However, to ensure the ongoing economic vitality of West Virginia's rail network, the State should set a goal of ensuring that all rail lines meet the 286,000-pound standard for freight car weight. The State should also evaluate the network for clearance constraints, and identify locations where addressing deficiencies would improve the performance of the rail system by attracting new traffic or retaining existing traffic that may otherwise be lost.
- Improved Service.** Rail customers, including coal producers, have expressed dissatisfaction with rail service. In recent years, rail service has declined significantly, initially as a result of efforts to improve the railroads' financial performance, which were then compounded through acute labor shortages following

the onset of the COVID-19 pandemic. This led shippers to substitute rail for less efficient transportation options, slowdowns in operations, and loss of sales in the most severe situations. Service has seen some improvement in 2023, a result of changes in rail management focus, adoption of new labor agreements, U.S. Surface Transportation Board (STB) actions, declining traffic, as well other external pressures. However, it is evident that further improvement is needed to ensure that rail remains a viable option for handling freight.

- **Sustainability.** The rail industry continues to examine potential solutions as it seeks to improve its sustainability and reduce the environmental footprint. To reduce fuel consumption, railroads have expanded their use of data-driven approaches for operations, including dispatching priorities, train routing, and train composition. The industry also is seeking a path away from diesel technology to zero emissions. Steps have included upgrading existing locomotives to reduce emissions—particularly in dense urban areas—to examining alternative fuels and propulsion technologies, including batteries and hydrogen fuel cells.
- **Aging Infrastructure.** There are 2,123 miles of active railroad in the State with 238 railroad bridges. These are maintained by the railroads based on traffic volumes, operations and anticipated need. Ties and rail are replaced according to industry standards to maintain track gauge and keep trains on the tracks at commercially appropriate speeds. Ongoing maintenance of track and bridges is critical for maintaining service reliability throughout the State and regulated through FRA safety inspections conducted by Federal and state inspectors. Many areas of West Virginia are topographically constrained, with railroad track providing the only connectivity in some parts of the State.

Bridges are inspected annually by trained railroad personnel as per FRA regulation, and more frequent inspections occur for high traffic bridges. FRA requires all railroads to have comprehensive bridge safety management programs, which include these inspections and guide bridge safety efforts, including evaluation and structural work methods. While Class I railroads have ongoing capital budgets for structure maintenance and replacement programs, short line repair and maintenance budgets tend to be limited.

4.1.3 Ports and Waterways Needs

For the West Virginia waterway system, the following needs were identified:

- **Flooding and Aging Infrastructure.** Ports and waterways are more vulnerable than any other freight mode to damage and disruption due to flooding. 2019 brought widespread flooding across the inland waterway system, including West Virginia, which received a disaster declaration in June 2019. There have also been multiple catastrophic events every year since. Flooding and extreme weather events are expected to continue to worsen, and it is critically important to invest in resilient port and waterway infrastructure to withstand future threats. The port system in West Virginia is made up of 277 miles of the Ohio River, and seven navigation locks and dams. These locks and dams provide essential mobility for vessels navigating the Ohio River; therefore, reliability is essential for cargo movement, commerce, recreational vessels, and other stakeholders. Many of the existing facilities are over 50 years old, and the American Society of Civil Engineers estimates approximately \$120 million of funding required over the next 15 years to provide critical maintenance.⁵⁰ Regional stakeholders noted that improved dam maintenance is needed to reduce delays and backlogs. Delays associated with dam maintenance have occurred at times. This appears to be related to a backlog of maintenance.
- **Multimodal Connectivity.** Stakeholders in the WWW region noted a general need for more rail-to-barge access points. Providing additional intermodal and multimodal access will facilitate additional tonnage shipped via barge versus other modes. There also is a need to coordinate business owners and shippers

⁵⁰ [Ohio Infrastructure | ASCE's 2021 Infrastructure Report Card](#)

along the inland waterway to increase use of the system, which will help the State's ports and waterways remain competitive with other modes of transportation in the State.

- **Container on Barge Facilities.** The Maritime Administration (MARAD) is promoting the use of the marine highway to move containers by barge on the U.S. waterways. This initiative will take trucks off the highways and reduce emissions in the transport of goods. However, there are no ports on West Virginia waterways that presently handle container-on-barge traffic. The proposed Port of West Virginia is a project proposed by Empire Diversified Energy to develop a port as a multifunctional, transmodal inland port terminal on the Ohio River in the City of Follansbee. However, this project has not moved forward and there continues to be a lack of facilities on the West Virginia Waterways that can handle container-on-barge cargo.

4.1.4 Air Cargo Needs

For the West Virginia air cargo system, the following needs were identified:

- **Maintaining Service.** Air cargo demand is expected to increase modestly in West Virginia through 2050. An important element associated with West Virginia cargo-handling airports is that the volume of traffic, both passenger and freight, is proportionately small, leading to many of the airports being designated either as a Small or Non-Hub facility based on the Federal Aviation Administration (FAA) airport designation rules. With limited all-freight aircraft serving these airports, much of the freight is transported as belly cargo on passenger aircraft. These provide essential service to reach rural and local communities with goods and services and allow the local businesses to share their goods and services globally through feeding to a hub airport. Should the market shrink and airlines stop serving these airports, this vital economic link may be lost.
- **Maintaining Road Connectivity.** Road access to airport cargo-handling facilities is essential to efficient operations. Most airports in West Virginia, including HTS, BKW and LWB, have adequate access to U.S. and Interstate highways with minimal congestion. CKB is directly next to U.S. 50 and connects to I-79, which makes the airport accessible by trucks, but the airport is surrounded by large number of settlements that may cause congestion before the truck can get onto I-79. CRW is relatively less accessible by ground transport as it is only connected to WV-114. There also is local traffic in Charleston with several junctions connected to I-64 and I-77. WVDOT should continue to monitor ground access to these facilities to prevent access issues by trucks.
- **Processing Facilities.** With the growth of ecommerce having such a significant impact on cargo transportation, should any of these companies decide to set up a location near an airport, facilities and/or buildings and land would be required to accommodate the activity. This could impact both the highway system and increase traffic, but also could lead to congestion getting to/from the airport where the freight arrives. It may well be necessary to consider this when assigning permits or leases to land adjacent to the airports for business purposes, and possibly safeguard land should it be deemed appropriate.
- **Technology and the Future of Aviation.** Advances in technology as well as future sustainable impacts on aviation will result in needs for the applicable infrastructure to be assessed and safeguarded. With Advanced Air Mobility and Urban Air Mobility coming to the industry in the cargo space as early as 2024, site selection studies will have to be undertaken as the potential for electric vertical take-off and landing (eVTOL) and drone vehicles will be entering communities and may not necessarily operate directly at the airport. Either way, serious and careful needs assessment studies will have to be undertaken.

4.1.5 Pipeline Needs

For the West Virginia pipeline system, the following needs were identified:

- **Monitor New Pipeline Developments and Last-Mile Terminal Connectors.** West Virginia's pipeline network is 100 percent privately owned and operated. However, as new pipeline developments come online (including the Mountain Valley Pipeline and Tri-State Corridor Gas Pipeline), it will be important for WVDOT to ensure sufficient last-mile truck access to intermodal sites.
- **Monitor Pipeline Safety.** PHMSA tracks pipeline safety incidents for all U.S. states. There were 88 recorded incidents in West Virginia from 2003 to 2022. Equipment failure accounted for 42 percent of incidents and natural forces accounted for 16 percent of the incidents recorded. Gas transmission has had the most reported incidents (66 percent), followed by gas distribution (19 percent) and hazardous liquid incidents (12 percent). Overall, West Virginia accounted for fewer than five percent of the reported pipeline incidents in the U.S. for the past 20 years. Continued data utilization by PHMSA to help optimize safety standards for the safe movement of our energy sources will be critical to maintaining and improving pipeline safety standards in West Virginia.

4.1.6 Multimodal Policy Needs

For the overall West Virginia multimodal system, the following policy needs were identified:

- **Ensure a Competitive State Workforce.** Worker pay is one factor that influences the availability and stability of the labor pool for freight-intensive sectors. However, for many low-income and entry-level workers, there are significant barriers to employment that hinder the ability to access and maintain employment, particularly in rural areas. These barriers to employment represent a variety of socioeconomic and geographic factors that incur costs or present logistical challenges for job seekers, including workforce readiness, childcare, transportation, and affordable housing. Supporting regional workforce development, including working with community and economic development agencies in implementing an outreach and marketing strategy to encourage interest in freight transportation careers.
- **Truck Driver Retention and Attraction.** Truck driver attraction and retention has been an issue for the trucking industry for many years. In the past, it has been referred to as a shortage of drivers, but the issue is more related to the challenges with attracting and retaining drivers in the field, as there are many aspects of truck driver training, licensing, and other resources that could be greatly improved to help increase driver attraction and retention. Truck drivers are required to comply with Federal Hours of Service (HOS) requirements, which are designed to prevent truck drivers from driving while fatigued. Truck parking can be challenging for drivers to locate while they are on the road. Beyond HOS, many other factors influence when and where a driver decides to park. For example, the driver could be carrying a load for a facility with a very strict delivery window, and drivers can face fines or potentially lose future business if they are not there on time. Another challenging aspect of the truck driver work environment is that many drivers are using their available HOS waiting at customer facilities to drop off or pick up loads, looking for available truck parking, trying to find customer facility, and in roadway congestion. At shipper facilities, truck drivers are often forced to wait several hours a day to load/unload freight and struggle to maximize their available time spent driving. In addition, many drivers do not have access to basic amenities like bathrooms or food vending at customer facilities. Addressing these issues may help reduce the driver shortage and improve retention by improving the quality of the work environment for drivers.
- **Leverage Federal Grant Funding Opportunities.** The Federal grant landscape has significantly expanded since the passage of the IIJA in November 2021. From fiscal year (FY) 2022 to FY2026, IIJA will provide \$973 billion in funding, of which \$550 billion is allocated for new investments in all modes,

including transportation, water, power and energy, environmental remediation, public lands, broadband and resilience. West Virginia can expect to receive approximately \$3.7 billion over the next five years in Federal highway formula funding for highways and bridges. This amount is approximately 31 percent greater than the average annual state Federal-aid highway formula under the previous law. West Virginia can also expect to receive approximately \$73 million over five years in formula funding to reduce transportation-related emissions, in addition to about \$83 million over five years to increase the resilience of its transportation system. WVDOT should continue to pursue Federal grant opportunities to bridge the funding gap for freight-specific projects in West Virginia.

- **Project Selection Processes.** The Hagerstown/Eastern Panhandle MPO noted that there is a need to rapidly and efficiently approve needed transportation projects. This need can be attributed to the significant rate of growth that the region currently is experiencing, however it also speaks to a WVDOT commitment to efficient and transparent data driven decision-making. The Roads to Prosperity program celebrated its five-year anniversary in 2022, having delivered over 1,200 projects across West Virginia. As program implementation starts to ramp down later this decade, new opportunities to streamline project development, selection, and delivery will be developed.
- **Better Integration of Freight Planning into WVDOT Activities.** The 2023 Freight Plan occupies a critical place in WVDOT's archive of modal plans, including the LRTP, which sets the agenda for all multimodal planning in West Virginia. Freight interacts with all of these modes, and proper coordination and the integration of freight planning into plans, studies, and programming is necessary to ensure safety, mobility, and enhanced quality of life for all transportation system users and modes. WVDOT may benefit from developing a set of freight considerations that can be applied for any corridor or location study, ensuring that all modal plans share a mission, goals, and values, and hiring a designated planner with a freight portfolio to augment agency expertise in freight.
- **Continued FAC Engagement.** The FAC was established to guide the update of the Freight Plan, and includes key freight and industry stakeholders important to the State's economy and workforce. These conversations and relationships are valuable to WVDOT, and it would be beneficial for WVDOT to continue to work with a group of freight-focused stakeholders after the completion of the 2023 Freight Plan to discuss infrastructure improvements, as they arise, that are important to the State's economic competitiveness.

4.2 Freight and Equity

Transportation equity seeks to ensure that the benefits and burdens of the transportation system are equitably distributed and to provide fairness in mobility and accessibility to meet the needs of all community members. Under Executive Order 13985, equity is defined as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment.⁵¹ However, other organizations have defined equity in varying terms. In accordance to the federal Justice40 Initiative, The West Virginia State Freight Plan follows the Council on Environmental Equity's Climate & Economic Justice Screening Tool (CEJST) definition for disadvantaged communities, which classifies Census tracts as disadvantaged if they are within the boundaries of Federally Recognized Tribes or if they meet the thresholds for at least one of the following eight "Categories of Burdens":⁵²

EQUITY IN TRANSPORTATION

Title VI of the Civil Rights Act of 1964 requires that WVDOT, as a Federal-aid recipient, and its subrecipients and contractors prevent intentional or unintentional discrimination in all programs and activities. Further, the Environmental Justice (EJ) Executive Order 12898 requires that all Federal and State agencies identify and address the effects of its programs and policies on minority and low-income populations.

Since the 2021 enactment of the IIJA, U.S. DOT has addressed equity in recent Notice of Funding Opportunities (NOFO) by giving priority consideration to applications that advance racial equity and address barriers to opportunity.

- **Climate Change:** Census tracts that are at or above the 90th percentile for expected agriculture loss rate, expected building loss rate, expected population loss rate, projected flood risk, or projected wildfire risk. These communities must also be at or above the 65th percentile for low income.
- **Energy:** Census tracts that are at or above the 90th percentile for energy cost or PM2.5 in the air. These communities must also be at or above the 65th percentile for low income.
- **Health:** Census tracts that are at or above the 90th percentile for asthma, diabetes, heart disease, or low life expectancy. These communities must also be at or above the 65th percentile for low income.
- **Housing:** Census tracts that experienced historic underinvestment or are at or above the 90th percentile for housing cost or lack of green space, lack of indoor plumbing, or lead paint. These communities must also be at or above the 65th percentile for low income.
- **Legacy Pollution:** Census tracts that have at least one abandoned mine land or formerly Used Defense Sites, or are at or above the 90th percentile for proximity to hazardous waste facilities, proximity to Superfund sites (National Priorities List (NPL)), or proximity to Risk Management Plan (RMP) facilities. These communities must also be at or above the 65th percentile for low income.
- **Transportation:** Census tracts that are at or above the 90th percentile for diesel particulate matter exposure, transportation barriers, or traffic proximity and volume. These communities must also be at or above the 65th percentile for low income.
- **Water and Wastewater:** Census tracts that are at or above the 90th percentile for underground storage tanks and releases or wastewater discharge. These communities must also be at or above the 65th percentile for low income.

⁵¹ <https://www.whitehouse.gov/briefing-room/presidential-actions/2023/02/16/executive-order-on-further-advancing-racial-equity-and-support-for-underserved-communities-through-the-Federal-Government/>.

⁵² [Methodology & data - Climate & Economic Justice Screening Tool \(geoplatform.gov\)](https://www.geoplatform.gov/methodology-and-data-climate-economic-justice-screening-tool)

- **Workforce Development:** Census tracts that are at or above the 90th percentile for linguistic isolation, low median income, poverty, or unemployment. These communities must also contain more than 10 percent of people ages 25 and older whose highest education is less than a high school diploma.

These “Categories of Burdens” use publicly available datasets as indicators of various burdens. A community is highlighted as disadvantaged (described as a “Justice40 community”) if it is in a census tract that is (1) at or above the threshold for one or more environmental, climate, or other burdens, and (2) at or above the threshold for an associated socioeconomic burden. Furthermore, a census tract that is completely surrounded by disadvantaged communities and is at or above the 50 percent percentile for low income is also considered disadvantaged.

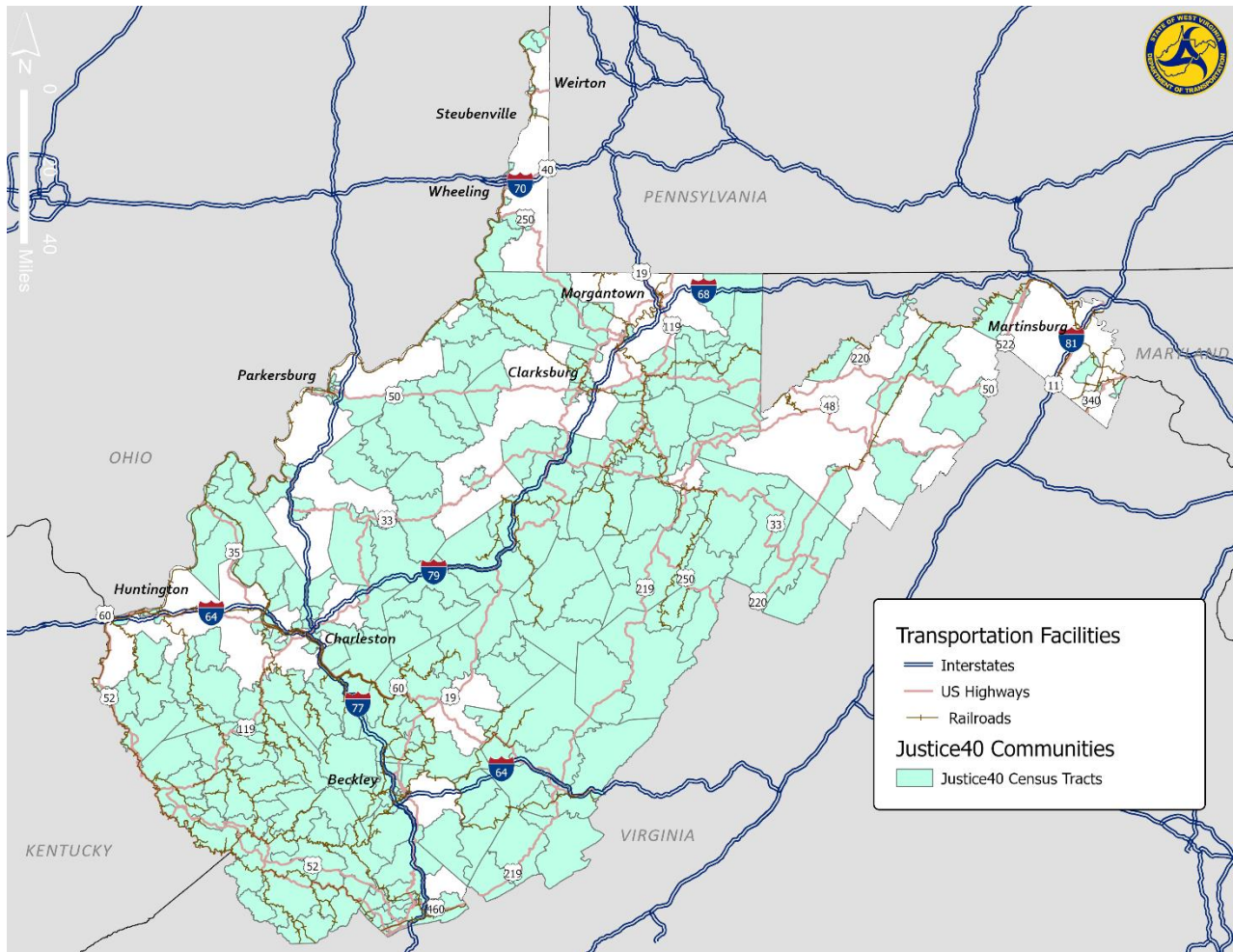
Figure 44 shows disadvantaged communities in West Virginia, based on the above methodology, in relation to the freight network. Of the 484 census tracts in the State, 298 (representing 62 percent) are identified as disadvantaged. These census tracts can be found in every region of West Virginia, with the highest concentration in the southwestern corner. From the 298 disadvantaged communities identified by the CEJST, almost all of them are health disadvantaged (283). As of 2017, the Appalachian Region performed worse than the United States as a whole in a wide variety of health indicators, including heart disease, cancer, chronic obstructive pulmonary disease, injury, stroke, diabetes, and suicide.⁵³ Mental unwellness, depression, and drug overdose was also markedly higher than at the national level.

Economic disadvantage is also highly prevalent. Fifty nine percent of census tracts in the State are at or above the 65th percentile for low income, and of the disadvantaged census tracts, 32 percent were identified as struggling with workforce development. As employment in the coal production sector, one of the State’s largest industries, dropped by 56 percent from 2001 to 2021, many residents have struggled to find work.⁵⁴ Additionally, 37 percent of the State’s Justice40 communities are disadvantaged specifically in terms of transportation access. Although many ADHS miles have been completed to compensate the originally limited coverage of Interstate highways in the Appalachian Region, accessibility is still a concern in the area.⁵⁵

⁵³ <https://www.arc.gov/report/health-disparities-in-appalachia/>.

⁵⁴ <https://www.arc.gov/report/coal-production-and-employment-in-appalachia/>.

⁵⁵ <https://www.arc.gov/report/transportation-access-in-appalachia/>.

Figure 44. Highway and Railroad Freight Network and Disadvantaged Communities

Source: Council on Environmental Quality, *Climate & Economic Justice Screening Tool*, 2023.

There are numerous benefits associated with freight generators, including the facilitation of economic activity, and the provision of jobs. However, there also are multiple potential negative externalities. Major roadways create noise and air pollution from vehicle emissions in adjacent neighborhoods. Railroads create noise issues and can create public health risks related to the transport of potentially hazardous materials.

Almost all of the communities in Figure 44 overlap with at least one type of freight corridor. Some of the southernmost disadvantaged communities in McDowell, Logan, and Mercer Counties connect with multiple rail corridors primarily used for transporting coal. U.S. highways 50, 52, 119, and 220 run through many of these communities. As for Interstates, I-64, I-77, and I-79 provide access to disadvantaged communities particularly in the Charleston metropolitan area. I-64 also provides access to disadvantaged communities near Huntington and in easternmost Greenbrier County. Additionally, I-81 runs through some of these census tracts in Martinsburg. Section 5.0 includes specific strategies and recommendations to address freight impacts on disadvantaged communities.

Freight generators adjacent to the highway and rail freight networks produce and attract freight to different regions of West Virginia. While the northern part of the State moves significant freight volume related to energy production, and the Eastern Panhandle is becoming a thriving ecommerce hub, few disadvantaged communities are directly affected by these freight movements. Other freight-intensive industries such as

chemicals and metals located along the Ohio River, or the forest products industry centered in the Allegheny Highlands region, do overlap some disadvantaged census tracts.^{56,57,58} Automotive suppliers' hubs around Huntington, and intensive, freight-moving coal-mining activities taking place in southern West Virginia overlap with disadvantaged communities to a considerable extent.⁵⁹

4.3 Freight and the Environment

Freight movement on West Virginia's multimodal transportation system impacts the environment in a number of ways, including impacts to natural habitats and ecosystems, watersheds and water quality, and air quality. Transportation infrastructure and vehicle impacts on the environment are controlled by Federal law, including the Clean Air Act and the National Environmental Protection Act, among others. WVDOT works with Federal partners, including the Environmental Protection Agency and state partners, including the West Virginia Department of Environmental Protection to monitor impacts and implement strategies to mitigate negative environmental outcomes from transportation.

4.3.1 *Natural Habitats and Wildlife*

As shown in Figure 45, West Virginia is home to 36 state parks, three national parks, and two national forests that serve as wildlife habitats. There also are two national wildlife refuges which are protected areas managed by the United State Fish and Wildlife Service (USFWS).

Areas of the State have been designated as critical habitats for threatened and endangered species by USFWS, including some corridors within Monongahela National Forest. Protected species that merited the creation of these areas include two types of darters—the candy darter and the diamond darter, as well as two types of bats—the Indiana bat and the Virginia big-eared bat. Overlap between the freight-intensive networks and protected wildlife areas is generally limited to U.S. highways and railroads, including within the New River Gorge National Park and Reserve or in the Monongahela National Forest. Section 5.0 includes specific strategies and recommendations that address West Virginia's freight transportation needs and impacts on wildlife and wildlife habitat loss.

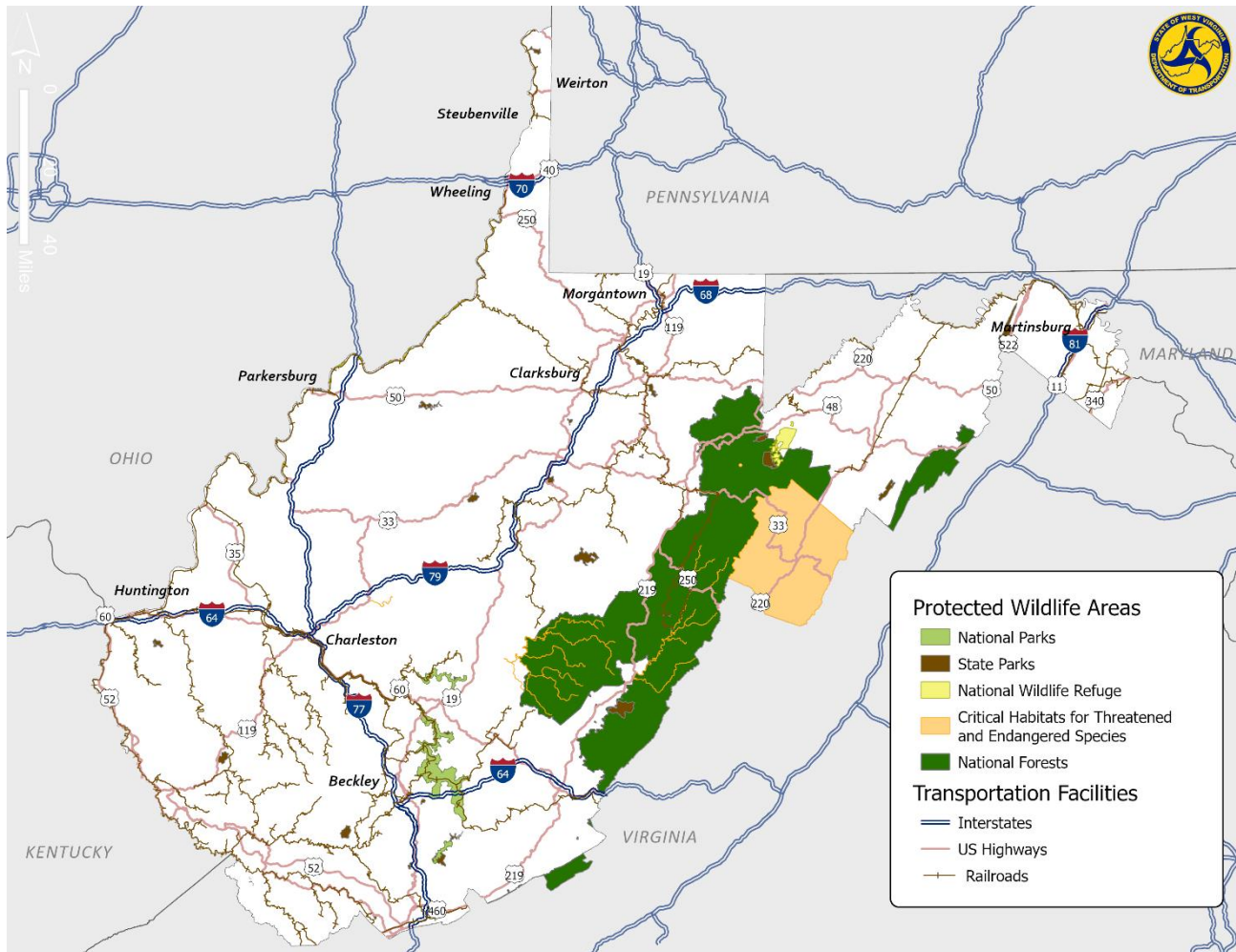
⁵⁶ <https://westvirginia.gov/industries/chemical-polymer/>.

⁵⁷ <https://westvirginia.gov/industries/metals/>.

⁵⁸ <https://westvirginia.gov/industries/forestproducts/>.

⁵⁹ <https://westvirginia.gov/industries/automotive/>.

Figure 45. Highway and Railroad Freight Network and Protected Wildlife Areas



Source: U.S. Fish and Wildlife Service; U.S. Department of Agriculture Forest Service; National Park Service; West Virginia Geographic Information Systems Technical Center.

4.3.2 Water Quality

Stormwater runoff from the transportation system can potentially pose significant impacts to the environment. Runoff can pick up and carry road surface pollutants that can contaminate water systems and the ecosystems they support. Mitigation of stormwater runoffs along highway and railroad freight corridors, particularly those traversing wildlife management areas or those directly adjacent to watersheds is crucial to limiting impacts to the environment and wildlife habitats.

For example, New River Gorge is an important watershed adjacent to a major freight corridor. The New River flows through three states, including West Virginia, is part of the Ohio River watershed, and is a federally protected non-navigable waterway. It is crossed by various highways and paralleled by CSX New River subdivision. Along the New River Gorge are a variety of active freight facilities and remnants of historical

activities such as coal mine entrances and abandoned industrial sites. Protecting this national resource and ensuring its water quality must be prioritized by the freight facilities and industry surrounding it.⁶⁰

More broadly, changes in land use surrounding transportation infrastructure can directly affect surface water quality and result in a need for mitigating measures to avoid flooding and other potential negative consequences on transportation infrastructure. This is particularly the case with long-established railroads and highways that have been constructed prior to any significant development adjacent to the right-of-way (ROW).

4.3.3 Air Quality and Greenhouse Gas Emissions

Freight transportation creates unique impacts on air quality. Diesel trucks are more intense emitters of particulate matter (PM) and often are replaced less frequently than passenger cars, leading to a generally older and less efficient fleets. Diesel locomotives also are intense emitters of PM, particularly short-haul, switcher locomotives.

The Clean Air Act authorized the U.S. Environmental Protection Agency (EPA) to protect and enhance the quality of the Nation's air resources to promote public health and welfare. Subsequently, standards were established for pollutants which were shown to threaten human health and the environment. These are known as the National Ambient Air Quality Standards (NAAQS).

West Virginia Division of Air Quality within the Department of Environmental Protection administers various programs which collectively work together to develop and maintain an effective, comprehensive air quality management program. This includes monitoring air quality, assisting companies with compliance, permitting to ensure economic growth is in harmony with existing rules and regulations, requiring the installation of monitoring and control equipment, and taking enforcement actions against violators. The essential air quality goals shaping transportation decision-making are to achieve and maintain the NAAQS and to implement specific controls targeting Hazardous Air Pollutants.

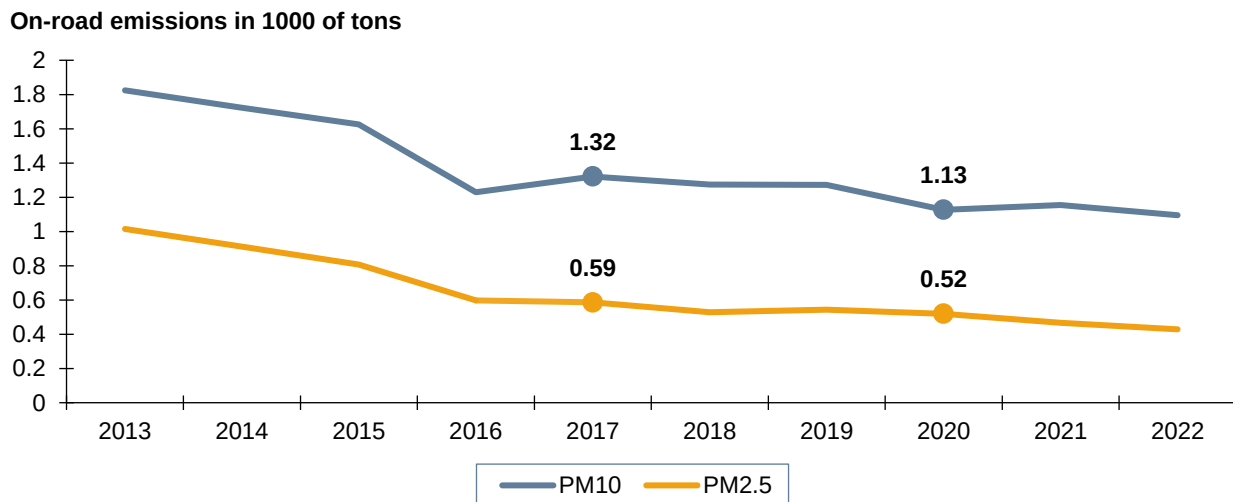
Criteria pollutants of concern in West Virginia include PM, which as noted earlier is a primary pollutant from freight vehicles. Brooke, Hancock, Kanawha, and Putnam Counties are maintenance areas for PM_{2.5}. Maintenance areas are geographic areas with a history of nonattainment, but now consistently meet the NAAQS. Data from monitoring stations is used to track pollutant concentrations and report the Air Quality Index (AQI) for those areas. In 2022, there was only one day in the Parkersburg area where the AQI was considered unhealthy for sensitive populations. In the four counties noted above, in the 1990s and early 2000s, unhealthy AQI days often totaled two weeks or more per year. Significant investments impacting emissions from industry, electricity, and on-road transportation has helped clean West Virginia's air over the prior decades.

Figure 46 presents the total statewide emissions trend over the last 10 years (2013–2022) based on data from EPA, reported through the National Emissions Inventory. While the trend has shown a steady decline, there are some underlying factors, particularly in the last six years, related to emissions from trucks that are noted in the following bullets for 2017 and 2020:

⁶⁰ National Park Service, <https://home.nps.gov/neri/learn/historyculture/places.htm>.

- In 2017, 46 percent of PM_{2.5} emissions and 34 percent of PM₁₀ emissions from on-road vehicles came from heavy duty vehicles (including trucks).⁶¹ In 2017, trucks represented 22 percent of rural Interstate VMT and 7 percent of urban Interstate VMT.⁶²
- In 2020, 65 percent of PM_{2.5} emissions and 50 percent of PM₁₀ emissions from on-road vehicles came from heavy duty vehicles (including trucks). In 2020, trucks represented 27 percent of rural Interstate VMT and 23 percent of urban Interstate VMT.
- Heavy-duty diesel trucks emitted around an average of 0.1 grams per mile PM_{2.5} in 2020 compared to light duty automobiles emitting less than 0.005 grams per mile PM_{2.5}.⁶³
- The change in the share of on-road emissions from trucks from 2017 to 2020 is in part due to the changing travel patterns associated with the pandemic.
- Emissions from heavy duty vehicles (primarily trucks, although this also includes buses), locomotives, and commercial marine vessels total 46 percent of all PM_{2.5} emissions from transportation.

Figure 46. Statewide Emissions from On-Road Vehicles



Source: Air Pollutant Emissions Trends Data. U.S. EPA.

While not considered in the Clean Air Act, greenhouse gases (GHG), is a key byproduct of burning fossils fuels (particularly gasoline and diesel). Carbon dioxide (CO₂) is the largest source of U.S. GHG emissions and has accounted for about 80 percent of total U.S. gross GHG emissions across the 1990–2021 time period.⁶⁴ The majority of CO₂ emissions are generated by fossil fuel combustion—about 92.2 percent in 2021. Transportation activities accounted for 37.9 percent of U.S. CO₂ emissions from fossil fuel combustion in 2021, with the largest contributors being light-duty trucks (37.3 percent of CO₂ emissions derived from transportation activities), followed by freight trucks (23.3 percent), and passenger vehicles (20.8 percent). In

⁶¹ National Emissions Inventory, U.S. EPA. <https://www.epa.gov/air-emissions-inventories>.

⁶² Highway Statistics Series, FHWA. <https://www.fhwa.dot.gov/policyinformation/statistics.cfm>.

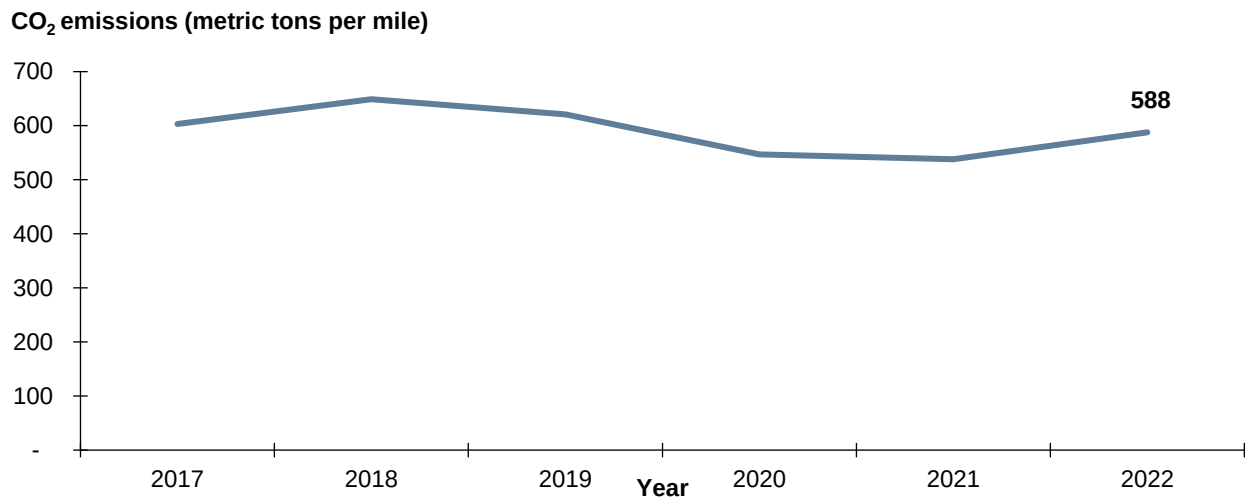
⁶³ U.S. DOT, Bureau of Transportation Statistics. <https://www.bts.gov/>.

⁶⁴ U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021," <https://www.epa.gov/system/files/documents/2023-04/U.S.-GHG-Inventory-2023-Main-Text.pdf>. Washington, D.C., 2023. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>.

West Virginia transportation activities accounted for a smaller share (10.9 percent in 2020) of CO₂ emissions when compared to the share for all of the U.S., and instead the electric power industry accounted for a larger share (48.1 percent in 2020) of CO₂ emissions in the State.⁶⁵

In West Virginia, truck traffic on Interstate highways in 2022 was estimated to generate approximately 588 metric tons of CO₂ per mile, as shown in Figure 47. Prior years showed a decreasing trend helped by the COVID-19 pandemic's reductions in economic activity. Although this CO₂ emission rate increased between 2021 and 2022, the latest value of 588 metric tons per mile in 2022 still remains below the 2019 level of 621 metric tons per mile.

Figure 47. Truck CO₂ Emissions per Mile for West Virginia Interstate Highways, 2017–2022



Source: Freight Mobility Trends Tool—National, State, and Urban Area Freight Statistics. FHWA, U.S. DOT.

In 2016, the EPA and National Highway Traffic Safety Administration (NHTSA) jointly adopted standards for medium- and heavy-duty vehicles to cut carbon pollution and improve fuel efficiency through model year 2027. The CO₂ and fuel consumption standards for heavy duty trucks start in model year 2021, increase incrementally in model year 2024, and phase in completely by model year 2027. The standards differ by vehicle weight class, roof height, and cab type (sleeper or day and are estimated to achieve up to 25 percent lower CO₂ emissions) and fuel consumption compared to the Phase 1 standards for model year 2018 to 2021 vehicles. In April 2023, EPA announced a proposal for more stringent standards to reduce greenhouse gas emissions from heavy-duty vehicles beginning in model year 2027. The program, known as the HD Phase 3 Greenhouse Gas Program, goes beyond the current standards by setting progressively lower standards each model year through 2032.⁶⁶

The impact of current and proposed emission standards and investments supporting more efficient freight operations will be crucial to reducing criteria pollutant and GHG emissions generated from transportation activities. This is reflected in West Virginia's performance measures, discussed in Section 4.4, and strategies, and recommendations, which are discussed in Section 5.0.

⁶⁵ U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks by State 2020, <https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals>.

⁶⁶ U.S. EPA, <https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-greenhouse-gas-emissions-standards-heavy>.

4.4 Freight Performance Measures

Freight performance measures provide insight to WVDOT and its stakeholders of how the performance of West Virginia's freight system aligns with the Freight Plan's goals and objectives. There are a number of possible freight performance measures that would be consistent with the goals and objectives and rely on data already collected and regularly reported, including measures already being reported per FHWA and FRA requirements. These measures are presented in Table 10. Objectives in this table not addressed by performance measures are oriented toward tracking the implementation of strategies and actions identified by the Freight Plan, consistent with WVDOT policies and programs, and capital investments in the STIP.

Table 10. Possible Freight Performance Measures Aligned with Goals and Objectives

Goals	Objectives	Performance Measures
System Condition, Efficiency, and Fiscal Sustainability	Maintain the existing freight transportation system and freight assets in a state of good repair	Bridge and pavement condition on designated highway freight corridors
	Invest in innovative technologies and program delivery strategies supporting freight movement	Miles (or percent) of freight corridors managed by ITS
	Explore new and sustainable revenue options which fund freight investments	
Safety and Security for All Users	Reduce fatalities and serious injuries on the multimodal transportation system	Truck involved fatal and serious injury crashes, highway-rail grade crossing crashes
	Enhance the safety and security of freight operators and cargo	Parked truck involved crashes
	Manage a resilient and redundant freight transportation network	
Economic Vitality	Improve intermodal freight connections, and expand direct freight access to economic activity centers and emerging industries/clusters	
	Address highway freight bottlenecks and improve first-mile/last-mile access	Truck travel time index
	Partner with universities, community colleges, and workforce training programs to educate and train new freight operators and supporting workforces	
Multimodal Mobility, Reliability, and Accessibility	Improve freight network reliability, reduce incident clearance time and recovery, and enhance management of operational disruptions on freight corridors	Truck travel time reliability index, truck buffer time index
	Improve access and availability of designated and safe truck parking facilities	Regular inventory of public truck parking spaces
	Create new opportunity for access to key destinations and jobs for underserved or disadvantaged populations	
Livable and Healthy Communities	Reduce emissions from freight movement	Criteria pollutant and GHG emissions
	Mitigate environmental and community impacts from freight movement	Crashes involving trucks and nonmotorized users
	Coordinate freight land use and transportation decisions	

For the potential freight performance measures identified in Table 10, Table 11 provides more detail as to considerations for measure definition, data, segmentation, and reporting. As noted, most of these measures are readily available through customized analysis of existing data sources and performance management programs. Highlights and performance trends for many of the measures in Table 3 are presented in the modal profiles associated with Section 3.0 of the Freight Plan.

Table 11. Freight Performance Measures

Measure	Description	Federal Measure	Data Source	Segmentation Options	Update Frequency
Highway Freight Measures—Safety					
Fatal and serious injury crashes	Truck involved fatal and serious injury crashes	No	WVDOT Crash Database	Collision type, route type, time-of-day, weather	Annual
Parked truck crashes	Parked truck crashes by severity	No	WVDOT Crash Database	Collision type, time of day, weather	Annual
Highway Freight Measures—Asset Condition					
Pavement condition	% of lane miles in good, fair, poor condition	Interstate and Non-Interstate NHS	HPMS	By functional class, district, region, corridor	Annual
Bridge condition	Bridge deck area and number of bridges in good, fair, poor condition	NBI bridges on the NHS	NBI	By functional class, district, region, corridor	Annual
Highway Freight Measures—System Performance					
Truck travel time reliability index	Truck travel time reliability (ratio of 95 th percentile travel time to 50 th percentile)	TTTR on Interstates	NPMRDS	Miles by TTTR range by functional class, district, region, corridor, and time of day	Annual
Truck buffer time index	Ratio of the difference between the 95 th percentile truck travel time and average travel time to the average travel time (percentage)	No	NPMRDS	Average percent by functional class, district, region, corridor, also by time of day	Annual
Truck travel time index	Ratio of the average truck travel time to the reference travel time (at speed limit)	No	NPMRDS	Index by functional class, district, region, corridor, and time of day	Annual
Truck parking inventory	Annual count of the number of truck parking spaces at public facilities	No	WVDOT, WV Turnpike Authority	By district, region, corridor, rest area/travel plaza	Annual
Truck emissions	Annual criteria pollutant and greenhouse gas emissions from on-road heavy- and medium-duty trucks	No	EPA, FHWA	Statewide by pollutant and source	Annual, available for prior year by summer
Rail Freight Measures					
Highway-rail grade crossing incidents	Highway-rail grade crossing incidents	No	FRA	By location, rail corridor, crash severity	Annual

Note: Formulas for the measures above can be found in the corresponding modal profile reports.

5.0 FREIGHT STRATEGIES AND INVESTMENTS

How does West Virginia implement the freight plan? ♦ What will West Virginia do to support freight in the State?

The 2023 West Virginia State Freight Plan identified several needs, challenges, and opportunities across the State's multimodal freight system, as detailed in Section 4.0. This section details West Virginia's strategies to meet those needs and challenges by strengthening the multimodal freight network and supporting the State's key industries and economic development opportunities. This section also presents the Plan's Freight Investment Plan (FIP).

5.1 Freight Strategies

West Virginia's 2050 LRTP lays out a framework to guide policies and strategies developed within short- and long-range system and modal plans, including the Freight Plan. Against a set of five overarching goals—which represent the same goal framework for this plan—the LRTP identified 19 highest priority actions, targeted for implementation through 2028. Many of these actions directly address the goals and objectives of this Freight Plan. Table 12 presents a subset of nine implementation actions from the LRTP and the Freight Plan goals they address.

Table 12. 2050 LRTP Highest Priority Actions Customized to the Freight Plan

L RTP Highest Priority Actions	Freight Plan Goal
Link bridge and pavement asset management and analysis systems for efficient data flow.	System Condition, Efficiency, and Fiscal Sustainability
Provide necessary funding amounts to prevent decline in current asset condition.	System Condition, Efficiency, and Fiscal Sustainability
Improve and increase communication across offices to leverage best practices for management of non-NHS facilities.	Economic Vitality
Based on past flood and repair data, identify locations that may need additional attention.	Livable and Healthy Communities
Install more safety devices, such as guardrails and brighter pavement markings, to prevent crashes.	Safety and Security for All Users
Update emergency management plans to better coordinate and respond to crashes and make drivers aware of detours to avoid major delays.	Multimodal Mobility, Reliability, and Accessibility
Communicate more efficiently and effectively between West Virginia DOT, other state agencies, local agencies, and other interested partners.	Economic Vitality
Pursue discretionary opportunities from the Federal government and other sources to leverage additional funding for transportation projects.	System Condition, Efficiency, and Fiscal Sustainability
Plan for and install more crossing safety devices at highway-rail crossing to reduce accidents and limit gate-running.	Safety and Security for All Users

Based on the five overarching goals adopted by WVDOT, this Plan presents a set of strategies that address freight-specific needs and concerns that should be advanced over short- and long-term implementation periods for the Freight Plan. The strategies were developed through a systematic review of stakeholder discussion, the LRTP, analysis of recent freight system performance and needs, along with previous freight plans and modal planning documents. Table 13 provides a summary of these strategies, and the primary Freight Plan goals that they address. The strategies are grouped across each of West Virginia's freight modes—highway, rail, water, air, and pipeline as well as multimodal, which captures strategies that are applicable across multiple modes or address concerns that are not associated with one particular mode.



Overall, there are 24 strategies recommended as implementation steps to address the needs and issues identified in West Virginia and to improve the status, condition, and operability of West Virginia's freight system. The sections that follow review each of the strategies in detail.

Table 13. West Virginia Freight Plan Strategies and Alignment with Freight Plan Goals and Objectives

	 System Condition, Efficiency, and Fiscal Responsibility	 Safety and Security for All Users	 Economic Vitality	 Multimodal Mobility, Reliability, and Accessibility	 Livable and Healthy Communities
Mode	Strategy				Goals
Multimodal	Monitor and position for Federal grant opportunities (e.g. Bridge Investment Program, Rural Surface Transportation Program, INFRA, RAISE, CRISI, Rail Crossing Elimination Program, etc.), and submit and support applications that advance freight system performance and economic competitiveness.				    
	Incorporate freight/economic development related impacts and benefits in the project selection processes.				  
	Develop a statewide transportation and economic development plan, including identifying strategies to mitigate existing barriers to employment and ensure a competitive state workforce.				  
	Regularly convene the FAC to discuss Freight Plan implementation, emerging needs, lessons learned, and partnership and funding opportunities. Continue working with the freight-focused stakeholders to promote infrastructure improvements that are important to West Virginia's economic competitiveness at ports, airports, and railroad facilities.				    
	Improve coordination with railroads that own and operate the rail network within the multimodal freight system.				  
	Advance investments in resilient and energy-efficient infrastructure, and incorporate freight-specific needs in the State Resiliency Plan and its deployment strategy.				  
	Invest in building redundancy into the system, including transportation management and operations, real time information, incident management, and work zone management.				  
Freight Highway	Continue implementation of the TAMP.				 
	Advance/accelerate delivery of projects that preserve bridges and pavement on truck routes.				 
	Periodically re-evaluate PHFS, National Highway Freight System (NHFS), Critical Urban and Critical Rural Freight Corridors (CU/CRFCs), and NHS intermodal connector designations.				 
	Conduct a truck parking and safety assessment and investment study to prioritize the list of truck-involved crashes safety hot spots, and truck parking locations that are most feasible for expansion, and develop near- and long-term implementation actions.				    
	Expand public truck parking facilities that are at or over capacity in accordance with truck parking investment study results.				    

Mode	Strategy	Goals				
Freight Rail	Maintain vitality of rail system and enhance utility to West Virginia's evolving economy.					
	Conduct assessment of opportunities for traffic development and develop prioritized state policy for at-risk rail lines.					
	Facilitate investment in freight rail infrastructure through state grants and/or loans, or a freight rail investment credit.					
	Support improved access to intermodal service by West Virginia industry.					
	Continue improving rail/highway safety by investing in at-grade crossings in accordance with the SAP. Where conditions warrant, consider other options, including grade separations.					
Ports and Waterways	Support national investment in state of good repair along the inland waterway system that serves West Virginia.					
	Improve road and rail access to inland port facilities.					
	Promote development opportunities at West Virginia port facilities and along the waterways.					
Air Cargo	Develop a State Aviation System Plan to identify, prioritize, and track airport needs in the State.					
	Maintain roadway connections between West Virginia's major markets and airport facilities.					
Pipeline	Improve multimodal access to pipeline terminals.					
	Support federal efforts to ensure pipeline safety.					

5.1.1 Multimodal Strategies

In 2022, WVDOT created the Division of Multimodal Transportation Facilities by combining four previously separate divisions: the Port Authority, Aeronautics Commission, the Division of Public Transit, and State Rail Authority. This was a critical step for WVDOT to work together as one agency and better manage and operate the multimodal transportation system. Seven strategies that address issues across all modes have been identified for this State Freight Plan. Overall themes include organizing for the successful pursuit of federal funding, ensuring that freight concerns are appropriately reflected in relevant aspects of WVDOT planning and implementation activities, and ensuring that the freight system will meet the present and future needs of West Virginia, and that it does so in an environmentally sustainable manner.

1. **Monitor and position for Federal grant opportunities and submit and support applications that advance freight system performance and economic competitiveness.** In recent years, Federal funding for freight improvements have been available through formula and non-formula grants. Formula grant funding that is directly applicable to freight needs includes the National Highway Freight Program, the FHWA Section 130 Railway/Highway Grade Crossing Program, and the FAA Airport Improvement Program. Competitive grant programs have offered increased opportunities for funding freight-beneficial projects. These include programs with relatively broad applicability, such as the Rural Surface Transportation Program, INFRA, and RAISE, while others are specific to a particular application or mode. These include the Bridge Investment Program, Rail Crossing Elimination Program, Consolidated Rail Infrastructure and Safety (CRISI), and National Infrastructure Project Assistance (MEGA) programs. WVDOT should ensure that it is familiar with the relevant federal grant programs and consider partnering with other agencies and private parties (where applicable) to maximize the opportunities to utilize grants for worthwhile projects.
2. **Incorporate freight/economic development related impacts and benefits in project selection processes.** For significant transportation-related investments, WVDOT should include assessments of the freight and economic development impacts as part of the project planning process. This will permit better prioritization of proposed investments, help identify and pursue funding options, and offer new avenues for stakeholder engagement.
3. **Develop a statewide good movement and economic development plan, including identifying strategies to mitigate existing barriers to employment and ensure a competitive state workforce.** Economic development and access to freight (and passenger) transportation are closely linked. With the rapid changes occurring in West Virginia's economy, including the State's transportation sector, WVDOT, in partnership with other state agencies and academic institutions should develop a statewide goods movement and economic development plan to position the State for economic growth over the long-term. Such a plan would link the needs of the State's major existing and emerging industries with present conditions and trends in freight transportation and logistics services, and identify areas where collective action by the State's public and private interests can leverage advantages and address competitive deficiencies. A key element will be to identify and develop strategies that address workforce needs in the coming years. With anticipated continued workforce shortages, status quo practices will not be sufficient to ensure that West Virginia's workforce is well prepared for the future.
4. **Regularly convene the FAC to discuss Freight Plan implementation, emerging needs, lessons learned, and partnership and funding opportunities. Continue working with the freight-focused stakeholders to promote infrastructure improvements that are important to West Virginia's economic competitiveness at ports, airports, and railroad facilities.** Regional and local planners, modal authorities, owners/operators, developers, and other freight stakeholders are encouraged to

collaborate to improve both road and rail access at freight facilities to ensure the safe and efficient movement of multimodal freight shipments. Rail access also is a highly sought-after amenity at many of these facilities, and it is critical to ensure that rail industry trackage is adequately developed and maintained to support freight activity. In addition to meeting FHWA guidance, continued engagement by WVDOT with the freight community will help demonstrate continued interest and inform WVDOT on evolving needs and issues, as well as provide avenues for collaboration on opportunities to improve the State's transportation system.

5. Improve coordination with railroads that own and operate the rail network within the multimodal freight system.

The WVDOT has efforts underway with the state's operating railroad companies to improve communications and expedite approvals essential to highway project delivery and system maintenance. The division is utilizing the services of an engineering firm that has strong and demonstrated experience in state-railroad project coordination and on-going relationships with railroads around North America. Efforts identified and in development include:

- a. Developing framework agreements with each railroad in lieu of creating and executing stand-alone agreements each time WVDOT needs to work with railroads or within their rights of way.
- b. Developing standard operating procedures and processes for project delivery and coordination along with a matrix of responsibilities within the division, and the proper contact based on the need, when is a field visit required, who should be represented at a field visit, coordination across the division as needed, and what approvals are needed for taking a project to construction.
- c. Updating WVDOT's methodology for identifying and prioritizing at-grade crossing selection for federally-funded safety improvements including flashers/gates and replacement and closures. This includes the review of railroad data to determine accuracy and identify trends.
- d. Updating the processes for document control and archiving of records for projects involving railroads.
- e. Developing standard specifications, including preliminary drawings or planimetrics, which include field and design notes, and processes to model timing requirements for at-grade crossing signals that are interconnected with traffic signals. These plans and specifications are essential in communicating the divisions' requirements and needs for work that railroad forces and contractors perform for WVDOT.

The above list along with additional items being reviewed and updated are part of a plan for continued collaboration and communication with the state's operating railroads. This will ensure consistent communication of upcoming needs and expectations for projects that involve railroads and improve and expedite project delivery. This effort is underway with the objective of having as many processes as practical implemented within the next twelve months.

6. Advance investments in resilient and energy-efficient infrastructure, and incorporate freight-specific needs in the State Resiliency Plan and its deployment strategy.

West Virginia is one of the most flood-prone states in the nation, with over 50 percent of infrastructure facilities, 46 percent of road miles, and 37 percent of commercial properties facing a flood risk. Since the catastrophic 2016 flooding that resulted in the loss of 34 lives and over \$54 million in damages to roadway assets alone, the State has experienced over 1,000 flood events.⁶⁷ The combination of infrastructure that was constructed decades ago, more severe weather events, and West Virginia's mountainous topography has made transportation infrastructure more vulnerable not only to service interruptions, but also increased the

⁶⁷ "Top of the list": W.Va. faces surprising climate dangers, <https://www.eenews.net/articles/top-of-the-list-w-va-faces-surprising-climate-dangers/>.

potential severity of impacts on communities. Conversely, increased development in some regions of the State has increased the vulnerability of transportation systems—particularly maritime, rail, and highway—to severe damage from storm runoff. Through cooperation among the involved public and private parties, WVDOT should support investments in measures that mitigate these effects in locations where particularly high risks to residents and infrastructure are present.

7. Invest in building redundancy into the system, including transportation management and operations, real time information, incident management, and work zone management.

Redundancy is vital for transportation networks to provide utility to users during disruptions and disastrous events. The ability to utilize backup systems for critical parts of the system that fail, is extremely important to facilitate safe transportation mobility and access for emergency response and recovery, and incident management. Parts of the State can encounter severe congestion by incidents or work zones. Recreational and seasonal travel and occasional special events can generate a significant amount of traffic as well. In many cases, there are limited detour routes and alternative means for travel. Transportation Systems Management and Operations (TSMO) strategies can be implemented to maintain or restore the performance of the existing transportation system before extra capacity is needed. The goal is to get the most performance out of the existing transportation facilities. This may enable WVDOT to "stretch" its funding to benefit more areas and customers.

5.1.2 Freight Highway Strategies

Five strategies that address freight highway asset management, condition, mobility, and safety and security issues have been identified for this State Freight Plan. WVDOT's TAMP noted through a set of integration strategies that projects identified as part of the TAMP should be coordinated where applicable with projects identified in the State Freight Plan. More generally, this means that strategies within this plan, particularly those related to asset management of bridges and pavement on the designated truck network, should be consistent with the overall investment approaches and decision-making process outlined in the TAMP. The TAMP is viewed as the technical foundation for data-driven decision-making for spending Federal dollars to preserve the NHS. Strategies for addressing asset management goals of freight highway infrastructure are to:

1. **Continue implementation of TAMP.** Specifically, to aid the State in implementing the high-level strategies in the TAMP. Decisions for asset management are increasingly informed through bridge and pavement management systems which incorporate standard operating procedures developed by DOH. The high-level strategies in the TAMP include the following: to design and schedule pavement projects to align with a roadway's lifecycle needs whenever possible utilizing the recommendations from the Deighton dTIMS pavement management system; continue the use of pavement preservation strategies, such as thin lift treatments to cost-effectively extend pavement life; evaluate innovative contracting methods and potential advantages of bundling projects to lower costs; continue to conduct frequent and regular inspections of bridges; continue to expand the use of preservation strategies that extend the service life of bridge components; invest in rehabilitation at appropriate times in a bridge's lifecycle by utilizing the recommendations from the Deighton bridge management system; and have more bridge projects "on the shelf".
2. **Advance/accelerate delivery of projects that preserve bridges and pavement on truck routes.** This strategy aligns with the TAMP implementation and focuses on the highway infrastructure vital to supporting freight movements across the State.

3. **Periodically re-evaluate PHFS, NHFS, CU/CRFCs, and NHS intermodal connector designations.**

U.S. DOT utilizes several different categorizations that may indicate a facilities' importance for freight and thus potential for freight-specific funding opportunities. These include the PHFS, NHFS, CUFC and CRFC, and NHS intermodal connector designations. WVDOT should regularly review these designations to ensure that they reflect current usage as well as trends from a freight perspective.

Another area of focus for highway strategies are safe and secure truck operations. The following strategies were identified to support improving statewide safety, including reducing transportation fatalities and serious injuries involving freight vehicles, improving the safety and security of drivers, cargo, and intermodal facilities, improving the resilience of the freight system particularly to severe weather events and other disruptions, and improving access and availability of designated and safe truck parking facilities by expanding and upgrading truck parking at existing facilities owned and operated by WVDOT, including travel plazas, welcome centers, and rest areas. These objectives are supported by the following strategies:

4. **Conduct a truck parking and safety assessment and investment study to prioritize the list of truck-involved crashes safety hot spots, and truck parking locations that are most feasible for expansion, and develop near- and long-term implementation actions.**

Expanding existing facilities is more cost-effective than constructing new facilities. As a starting point the 19 facilities shown in Table 14 that are at or over capacity (less than 90 percent utilization) and near capacity (70–89 percent utilization) at peak hour could be considered for possible expansion. Existing facilities already have basic amenities (e.g., restrooms, drinking water, vending, etc.), established cleaning services, security, and infrastructure such as utilities and access ramps. The Beckley and Bluestone travel plazas on the West Virginia Turnpike are currently closed for renovations which include building more spaces for truck parking.⁶⁸ The outputs from the study, when incorporated into applications for Federal grant funding, will make a strong case for funding these improvements. Other technology, policy, and program strategies for improving truck parking that may be considered as a part of the Truck Parking study include expanding their Truck Parking Information Management System, developing guidelines for integrating truck parking into the WVDOT project development process, considering truck parking needs prior to the purchase or sale of ROW, considering truck parking needs and feasibility of converting to a dedicated truck parking facility prior to the closure of a WVDOT facility, reassessing public facility designs to accommodate oversize and overweight vehicles, collecting truck and car utilization data, and encouraging, educating, and coordinating with local and regional agencies to advance truck parking in their jurisdictions. WVDOT should also continue to work on improving the geolocation information for crash data. Being able to accurately analyze the location of truck-involved crashes and the contributing factors and circumstances surrounding the crashes, will allow WVDOT to conduct analysis of safety hot spots for truck-involved crashes. This will provide WVDOT greater visibility into the nuances surrounding these crash types, as well as identify and prioritize safety hotspot locations for improvement and implementation.

5. **Expand public truck parking facilities that are at or over capacity in accordance with truck parking investment study results.** Conceptual layouts and cost estimates should be developed for sites with the greatest need, as inputs into a high-level assessment of the costs and benefits needed to identify projects with the greatest potential return on investment. Depending on the footprint of the existing facility and the desired amount of new capacity, additional capacity may be able to fit within existing ROW limits or with little ROW acquisition. Other advantages of expanding existing facilities

⁶⁸ Office of the Governor. 11/18/2022. "Gov. Justice announces plans to renovate WV Turnpike travel plazas, construction to begin in February 2023." Accessed 6/27/2023 from: <https://governor.wv.gov/News/press-releases/2022/Pages/Gov.-Justice-announces-plans-to-renovate-WV-Turnpike-travel-plazas,-construction-to-begin-in-February-2023.aspx>.

include known demand levels and driver familiarity. At existing facilities, demand is known or could be determined based on observed driver parking behavior. Another advantage of expanding an existing facility is driver familiarity as motor carriers are already aware of the location's existence. Because of these advantages, there is a low risk that new capacity at an existing facility would be underutilized. The primary disadvantages of existing facilities are that they may not be located where capacity is most needed, and there may not actually be sufficient space to add capacity.

Table 14. Publicly-owned Truck Parking Facilities for Expansion Consideration

Name	Location	Current Number of Spaces	Peak-Hour Demand	Additional Spaces Needed Now
Morton Travel Plaza	N I-77, MM 72, Morton, WV	30	76	46
Beckley Travel Plaza	I-77 Exit 45, Beckley, WV	142	185	43
Falling Waters Welcome Center SB	S I-81 MM 25, Falling Waters, WV	20	41	21
Inwood Welcome Center NB	N I-81 MM 2, Bunker Hill, WV	19	37	18
Elkridge Rest Stop SB	S I-64 MM 69, Eskdale, WV	18	35	17
Bluestone Travel Plaza	N I-77, MM 18, Princeton, WV	107	124	17
Burnsville Rest Area NB	S I-79 MM 85, Orlando, WV	12	27	15
Rest Area SB	S I-77 MM 18, Camp Creek, WV	20	32	12
Truck Park & Rest (Spring Mills Truck Rest Area)	S I-81 MM 19, Falling Waters, WV	15	25	10
Hurricane Rest Area WB	I-64, Hurricane, WV	14	23	9
Mineral Wells Rest Area NB	N I-77, MM 165 Mineral Wells, WV	10	18	8
Mineral Wells Rest Area SB	S I-77, MM 165, Mineral Wells, WV	10	15	5
Morgantown Welcome Center SB	S I-79, MM 159, Morgantown, WV	19	21	2
Williamstown Welcome Center	I-77, MM 185, Williamstown, WV	23	22	— ¹
Servia Rest Area NB	N I-79, Frametown, WV	15	13	— ¹
Meadowbrook Rest Area NB	N I-79, MM 123, Bridgeport, WV	17	15	— ¹
Hurricane Rest Area EB	I-64, Hurricane, WV	18	16	— ¹
Meadowbrook Rest Area SB	S I-79, MM 123, Bridgeport, WV	18	13	— ¹
Huntington Welcome Center EB	E I-64, MM 10, Huntington, WV	20	15	— ¹

¹ Indicates that there are no additional spaces needed now, but the need of more spaces may develop in the future.

Source: American Transportation Research Institute; Cambridge Systematics, Inc. analysis.

5.1.3 Freight Rail Strategies

West Virginia's freight rail system strategies were identified through a review of existing conditions, input gained from stakeholder surveys and interviews, as well as strategies identified by the 2020 State Rail Plan. Identified freight rail needs include access, highway-rail crossing improvements and grade separations, and ensuring that the rail system is positioned to meet current and future needs.

1. **Maintain vitality of rail system and enhance utility to West Virginia's evolving economy.** Freight rail offers significant advantages over other modes from the standpoint of energy efficiency, transportation cost, and overall environmental impact. However, by themselves, these attributes are not sufficient to ensure their long-term relevance, as railroads must adapt by providing service that will retain existing business as well as attract new markets. To meet these challenges, railroads need to have both physical infrastructure and commercially attractive service, of which key elements include frequency, travel times, rates, and equipment. While the burden for accomplishing these goals fall on the private railroads, West Virginia can support or facilitate these efforts through the following additional strategies.
2. **Conduct assessment of opportunities for traffic development and develop prioritized state policy for at-risk rail lines.** As a result of the ongoing contraction of West Virginia's coal extraction industry, declining rail traffic volumes have and will continue to place segments of the State's rail network at risk of downgrading or outright abandonment. Instead of simply reacting to threats of abandonment as they occur, West Virginia should anticipate and plan for their eventuality by assessing the rail network, focusing on abandonment risk from changing traffic patterns and future potential through rail-oriented industrial and other development. Principal outcomes will be an understanding of the current state of the system, prospects for abandonment, opportunities for growth, and setting of state strategies and priorities for engagement. This includes identification of investment needs, along with funding options (such as federal grants) to realize improvements.
3. **Facilitate investment in freight rail infrastructure through state grants and/or loans, or a freight rail investment credit.** Currently, West Virginia does not have a state-funded program for freight rail improvements, nor does it have a state version of the 45G Federal tax credit program that allows railroads a tax credit for each dollar short lines and regionals spend on track and bridge improvements. These schemes help support financially constrained short lines in making critical improvements by leveraging private investment through public sector dollars. Successfully implemented by many other states, Local Rail Freight Assistance programs typically provide grants or low-cost loans to improve railroad infrastructure, while Industrial Rail Access Programs facilitate shipper access to rail service, typically through the rehabilitation or new construction of rail plant at shipper sites or transload facilities.
4. **Support improved access to intermodal service by West Virginia industry.** While the commercial failure of the Pritchard intermodal terminal may have indicated a lack of demand for a terminal located within the State, the availability of intermodal service to West Virginia industry is of increasing importance. Whether these terminals are physically located in West Virginia or an adjacent state, the exact location is of less importance than the markets served by the facility, service levels, ease of access for trucks making deliveries and pick-ups, and travel times to and from industrial and consumer markets within West Virginia. To facilitate the efficiency in using intermodal services, the State should identify the locations of the principal terminals that serve West Virginia industry, and the characteristics of the associated roadway network within West Virginia that is used to access these facilities.
5. **Continue improving rail/highway safety by investing in at-grade crossings in accordance with the SAP.** Where conditions warrant, consider other options, including grade separations. Highway-rail grade crossing safety is a WVDOT priority, as these incidents remain one of the leading causes of fatalities in the railroad industry, behind trespassing, accounting for about 30 percent of railroad-related fatalities. While West Virginia has one of the Nation's lowest highway-rail grade crossing incident frequencies, evolving development patterns, growing highway traffic, as well as deteriorating grade crossings and obsolete hardware, calls for continued investment in improving grade crossings and eliminating crossings through closures and grade separations. The FHWA Section 130 program is used as a basis for funding most crossing improvements in the State, the WVDOT has an opportunity to pursue

additional funding through a range of federal grant programs, including CRISI and the Rail Crossing Elimination Program.

5.1.4 Ports and Waterways Strategies

Three strategies that address issues for ports and waterways have been identified for this plan. The central objective to these strategies is to support the state of good repair along the inland water system including points of access to the waterways by road and rail and to promote future development opportunities.

1. **Support national investment in state of good repair along the inland waterway system that serves West Virginia.** According to the American Society of Civil Engineers, smaller, inland ports are challenged to maintain their infrastructure and have difficulty competing for Federal grants. The West Virginia Port System is managed by the WVDOT Division of Multimodal Transportation Facilities and the USACE oversees all structures in or over any navigable water of the U.S., per the Rivers and Harbors Act. Both agencies manage port-related data and maintenance. In 2023, MARAD's announcement of \$450 million in annual funding for the Nation's Port Infrastructure and Development Program would help open opportunities to modernize ports throughout the nation. More funding opportunities for port and waterway capital improvements would prioritize projects that would improve the safety, efficiency, and reliability of the goods that move through the Nation's ports and waterways. Some of these projects could include fast charging stations, port electrification components, developing a scalable plan for transition of an existing port terminal to zero-emission technologies and the modernization of electric and stormwater infrastructure for port facilities. Prioritizing these types of projects would begin the process of identifying the infrastructure and capital improvement opportunities of ports and inland waterways within West Virginia.
2. **Improve road and rail access to inland port facilities. West Virginia's inland port facilities provide multimodal connections between the State's waterways and multiple modes to enable the efficient movement of freight.** Roadway access to these sites is often a local or minor road connecting to a major highway, and may not be designed to support high volumes of truck traffic. Rail access is also a highly sought-after amenity at many of these facilities, and it is critical to ensure that rail spur track is adequately developed and maintained to support freight activity. Regional and local planners, modal authorities, owners/operators, developers, and other freight stakeholders are encouraged to collaborate to improve both road and rail access at inland port facilities to ensure the safe and efficient movement of multimodal freight shipments.
3. **Promote development opportunities at West Virginia port facilities and along the waterways.** The Port of Huntington Tri-State and the Mid-Ohio Valley Statistical Port District are the only two public port facilities in the State, and both cover multistate districts with dozens of marine terminals. Better coordination of business owners and shippers within those public port districts may improve the competitiveness of maritime freight shipping. There may also be opportunities to develop additional rail-to-barge access points, which was identified as a key need for the State's waterways network. WVDOT should promote development opportunities at existing facilities and potential sites, support economic development opportunities with data, and consider opportunities for transportation infrastructure investment.

5.1.5 Air Cargo Strategies

Two strategies that address issues for air cargo have been identified for this plan. The central objective to these strategies is to support further investigation into the needs of the air cargo system and to maintain the connections between West Virginia's roadways and air cargo facilities.

1. **Develop a State Aviation System Plan to identify, prioritize, and track airport needs in the State.** A State Aviation System Plan (SASP) documents and/or evaluates the needs and performance of airports both individually and at the State level. West Virginia does not currently have a SASP, which limits the State's ability to see "at a glance" the needs of the State aviation system and prioritize investments and opportunities. A SASP can help the WVDOT identify and track investment needs, as well as guide policy changes, and communicate information on the importance of the State's aviation system to decision makers. Air cargo opportunities and the needs of air cargo shippers, freight forwarders, and customers in West Virginia should be a key consideration as part of the plan.
2. **Maintain roadway connections between West Virginia's major markets and airport facilities.** Connections to air cargo facilities, both within and outside of the State, are critical to maintain and grow West Virginia's economy. WVDOT, as part of its investments in highway infrastructure, can ensure that efficient access to facilities within the State are maintained. Investments to maintain efficiency on key corridors such as all Interstates and ADHS roadways are also vital to ensuring that West Virginia's businesses and customers have access to global markets via air cargo facilities outside the State.

5.1.6 Pipeline Strategies

Two strategies that address issues for pipelines have been identified for this plan. While pipeline infrastructure is largely a private-sector concern, there is a public interest in ensuring ongoing safety and access.

1. **Improve multimodal access to pipeline terminals.** West Virginia's pipeline freight facilities are critical transfer points on the pipeline system, providing multimodal connections to enable the efficient movement of freight. Pipelines interact with pipeline terminals, refineries, or storage facilities, which process, store, and link pipeline commodities to other modes of freight transportation, such as rail, barge, and truck. Roadway access to these sites is often a local or minor road connecting to a major highway, and these local or minor roads may not be designed to support high volumes of truck traffic. Regional and local planners, modal authorities, owners/operators, developers, and other freight stakeholders are encouraged to collaborate to improve access at pipeline facilities to ensure the safe and efficient movement of essential energy shipments.
2. **Support federal efforts to ensure pipeline safety.** Despite the significant safety benefits of transporting hazardous materials through pipelines versus other modes, minimizing incident across the pipeline network must continue to be a priority for WVDOT and West Virginia overall. Although there is not a direct role for WVDOT in the planning and management of pipelines, WVDOT must understand how pipelines interact and affect other transportation modes, and should monitor incidents and other safety data as provided by PHMSA and U.S. DOT.

5.2 Freight Investment Plan

This section discusses the IIJA requirements and presents West Virginia's IIJA-compliant FIP. The FIP is a fiscally constrained investment approach for Federal funding. The NHFP provides funding to improve the efficient movement of freight on the NHFN. The NHFN is comprised of the PHFS, CRFC, CUFC and any portion of the Interstate System not designated as part of the PHFS. Per the IIJA, state freight plans must provide a FIP over an eight-year period, describe how the funds would be invested, and be fiscally constrained.

Projects eligible for NHFP funding must contribute to the efficient movement of freight on the NHFN and be identified in the FIP. The Projects eligible for funding include all planning, feasibility, preconstruction, mitigation, and construction activities for highway, bridge, and multimodal capacity. Other opportunities for funding include investments in technology, safety, operations, parking, security, and alternative fuels to improve system performance as well as strategic planning, analysis, and data collections efforts. Up to 30 percent of NHFP funds each year may be used for intermodal or freight rail projects, including improvements located within private facilities, per the IIJA which was passed in November 2021.⁶⁹

This fiscally constrained FIP includes the proposed use of NHFP funds distributed to West Virginia. West Virginia's apportionment of the NHFP funds for the period spanning 2023–2028 is \$91 million or \$15.2 million annually. These funds will go towards two Corridor H segments: Parsons-Davis and Hardy Co 23/12—VA State Line which include but not limited to the construction of a divided four lane roadway, plans for six twin bridges, paving, pavement markings, signing and compensatory mitigation. These Corridor H segments are included in the WVDOT STIP 2023–2028 and are CRFCs. The WVDOT proposes to direct these future apportionments of NHFP funds to aid in the acceleration of ADHS Corridor H to improve freight flow through the central part of the State.⁷⁰ No state match is required for the completion of Corridor H. The proposed funding for these segments is shown in Table 15.

Table 15. West Virginia Freight Investment Plan, FY2023–FY2028

Project and Description	Funding Source (\$Millions)	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	Total
Corridor H: Parsons-Davis	Total Project Cost	\$97.6	\$54.5	–	–	–	–	\$152.1
	NHFP	\$15.2	\$25.1	–	–	–	–	\$40.2
	Other Federal	\$82.4	\$44.6	–	–	–	–	\$111.8
	State Match	–	–	–	–	–	–	–
Corridor H: Hardy Co 23/12—VA State Line	Total Project Cost	–	–	\$144.9	\$144.9	\$144.9	\$144.9	\$579.6
	NHFP	–	–	\$15.2	\$30.3	\$45.4	\$60.6	\$151.5
	Other Federal	–	–	\$129.8	\$114.6	\$99.5	\$84.3	\$428.1
	State Match	–	–	–	–	–	–	–

⁶⁹ 23 U.S. Code § 167 - National highway freight program.

⁷⁰ WVDOT 2023-2028 STIP https://transportation.wv.gov/highways/Programming/STIP/Documents/Workshop%20%232/Draft%20FFY%202023-4_Conduct_a_truck_parking_and_safety_assessment_and_investment_study_to_prioritize_the_list_of_truck-involved_crashes_safety_hot_spots_and_truck_parking_locations_that_are_most_feasible_for_expansion_and_develop_near- and_long-term_implementation_actions_2028%20STIP%20Narrative%20%281%29.pdf.

5.3 Conclusions and Next Steps

The 2023 State Freight Plan documents the multimodal freight transportation strengths, weaknesses, opportunities and challenges, and provides a blueprint for addressing the State's current and future freight transportation needs. The Freight Plan presents 24 strategies to help WVDOT address these challenges and needs, including aging infrastructure, safety concerns, truck parking, rural and multimodal connectivity challenges, system capacity constraints, bottlenecks, system resiliency, and funding challenges.

While all the strategies included in the Plan are important and should be implemented, the following nine strategies are the highest priority for short-term implementation of this Freight Plan, and are expected to yield the greatest benefits for West Virginia and WVDOT:

1. **Regularly convene the FAC** to discuss Freight Plan implementation, emerging needs, lessons learned, and partnership and funding opportunities. (Multimodal)
2. **Conduct a truck parking and safety assessment and investment study** to prioritize the list of truck-involved crashes safety hot spots, and truck parking locations that are most feasible for expansion, and develop near- and long-term implementation actions. (Freight Highway)
3. **Expand public truck parking facilities that are at or over capacity** in accordance with truck parking investment study results. (Freight Highway)
4. **Monitor and position for Federal grant opportunities** (e.g. Bridge Investment Program, Rural Surface Transportation Program, INFRA, RAISE, CRISI, Rail Crossing Elimination Program, etc.), and submit and support applications that advance freight system performance and economic competitiveness. (Multimodal)
5. **Incorporate freight/economic development related impacts and benefits in project selection processes.** This will permit better prioritization of proposed investments, help identify and pursue funding options, and offer new avenues for stakeholder engagement. (Multimodal)
6. **Develop a statewide transportation and economic development plan**, including identifying strategies to mitigate existing barriers to employment and ensure a competitive state workforce. (Multimodal)
7. **Conduct assessment of opportunities for freight rail traffic development and develop prioritized state policy for at-risk rail lines.** (Freight Rail)
8. **Continue improving rail/highway safety by investing in at-grade crossings** in accordance with the SAP. Where conditions warrant, consider other options, including grade separations. (Freight Rail)
9. **Improve coordination with railroads that own and operate the rail network within the multimodal freight system.** The WVDOT has efforts underway with the state's operating railroad companies to improve communications and expedite approvals essential to highway project delivery and system maintenance. (Multimodal)

Implementation of the Freight Plan will only be successful with the participation and collaboration of all public- and private-sector users and owners of the transportation system, including freight industry stakeholders, and federal, state, regional and local agencies. WVDOT will continue to leverage the relationships developed from the FAC in addition to engaging other stakeholders during the implementation of the Freight Plan.