



West Virginia
**Department of
Transportation**

2050 WEST VIRGINIA STATEWIDE LONG-RANGE TRANSPORTATION PLAN

ACKNOWLEDGEMENTS

The West Virginia Department of Transportation (WVDOT) gratefully acknowledges the commitment, cooperation, and professional contributions of the following:

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The **Leadership Team** met four times during the LRTP process and participated in surveys and interviews as requested. The Leadership Team included:

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The **Policy and Technical Team** met four times during the LRTP process and completed surveys, fulfilled data requests, and participated in interviews. The Policy and Technical Team included:

- WVDOH – Engineering Division
- WVDOH – Traffic Engineering Division
- WVDOH – Operations Division
- WVDOH – Programming Division
- WVDOH – Materials Division
- WVDOH – Planning Division
- WVDOH – Development Office
- WVDOH – Budget Division
- WVDOH – Finance Division
- WVDOH – Strategic Data Management and Technology Division
- WVDOT Equal Employment Office
- Aeronautics Commission
- Parkways Authority
- Division of Public Transit
- State Rail Authority
- Governors Highway Safety Program
- WV Public Transit Association
- WV Economic Development Agency
- WV Development Office
- WV Tourism Office
- WV Bureau of Senior Services

- WV Division of Natural Resources
- WV Division of Environmental Protection
- Bel-O-Mar Regional Council
- Brooke-Hancock-Jefferson (BHJ) Metropolitan Planning Commission
- Fayette/Raleigh MPO
- Hagerstown/Eastern Panhandle Metropolitan Planning Organization
- KYOVA Interstate Planning Commission
- Morgantown Monongalia Metropolitan Planning Organization
- Regional Intergovernmental Council
- Wood-Washington-Wirt (WWW) Interstate Planning Commission
- Region VII Planning and Development Council

Our **Federal Highway Administration (FHWA)** partners also participated throughout the process.

- Brian Hogge
- Jason Workman
- Chandra Inglis-Smith

WVDOT staff assisted outreach and coordination, including:

- Jennifer Dooley, Director, WVDOT Public Relations Office
- Josh Sizemore, Strategic Data Management & Technology Division

WVDOT contracted with **Cambridge Systematics**, along with teaming partner Mott MacDonald, to deliver the 2050 LRTP.

Cambridge Systematics, Inc.
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Raleigh, NC 27607

A MESSAGE FROM THE SECRETARY'S OFFICE

West Virginia's multimodal transportation network continues to grow and evolve to better connect our communities to educational resources, healthcare services, advanced technologies, tourism attractions, and economic opportunities. Governor Jim Justice has made transportation a priority, supporting key initiatives to maintain our roadways and safeguard our loved ones. His leadership continues to support the mission of West Virginia Department of Transportation (WVDOT) to create and maintain a multimodal and inter-modal transportation system that supports the safe, effective, and efficient movement of people, information, and goods that enhances the opportunity for people and communities to enjoy environmentally sensitive and economically sound development.

WVDOT has executed complex transportation initiatives funding vital improvements to ensure assets are maintained and all forms of travel flow smoothly. Multi-year bond issuances through the Roads to Prosperity Program have raised significant funding to pay for roadway enhancements, including: rehabilitating bridges along I-70, the I-77 widening through Beckley, the I-64 widening between Huntington and Nitro, the US 522 Berkeley Springs Bypass, the statewide Slide Repair Program, continued progress on completing Corridor H and the Coalfields Expressway, and over 19,000 miles of roadway improved already in 2021 through the Secondary Road Maintenance Initiative. West Virginia is home to some of the nation's most treasured natural attractions and WVDOT ensures that you enjoy the beautiful country roads while traveling in and through our State.



BYRD E. WHITE, III
Cabinet Secretary
Commissioner of Highways

WVDOT knows modernizing our transportation assets will keep our visitors and residents moving, and the 2050 Long Range Transportation Plan (LRTP) outlines how we can address your priorities. We recognize that travel behaviors are changing and traditional funding mechanisms are no longer solely sufficient. We welcome your feedback and continue to ask for your input as we strive to deliver your transportation system. Governor Jim Justice has outlined your vision crafted from extensive input from citizens and travelers, creating measurable goals and objectives that give a 30-year guide for strategic transportation investments, improving connections to jobs, schools, services, recreation facilities, and broadband to enhance state-wide access to global opportunities.

This LRTP satisfies U.S. Department of Transportation requirements as specified in the Code of Federal Regulations, 23 CFR 450.216. The LRTP was also developed consistent with Federal and State requirements for consultation with partners, officials, and input from West Virginia citizens. More information on the entire LRTP process is available on the [WVDOT website](#).

We welcome your review of the LRTP and your continued partnership with us in helping to shape West Virginia's future multimodal transportation system.



JIMMY WRISTON
Deputy Secretary
Deputy Commissioner of Highways



SUNRISE VIEW FROM BEAR ROCKS AREA OF THE DOLLY SODS WILDERNESS

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EXECUTIVE SUMMARY

What is the West Virginia Multimodal Statewide Long Range Transportation Plan or LRTP?

The 2050 LRTP is a federally required plan that guides future transportation policy and investment to:

1. Assess the current and future condition of West Virginia's multimodal transportation system.
2. Identify transportation priorities and funding options to prepare for future challenges and opportunities.
3. Provide a blueprint to strategically preserve, modernize, and manage the state's assets for future generations.

The LRTP helps connect **long-range goals, measures, and needs**; **strategies and programs**; **strategic plans**; **capital programs**; and **performance management** within WVDOT to achieve **five goals** through a **five-step** approach. The LRTP was shaped by input from each of WVDOT's divisions, including Aeronautics, Highways, Motor Vehicles, Parkways, Transit, and Rail.

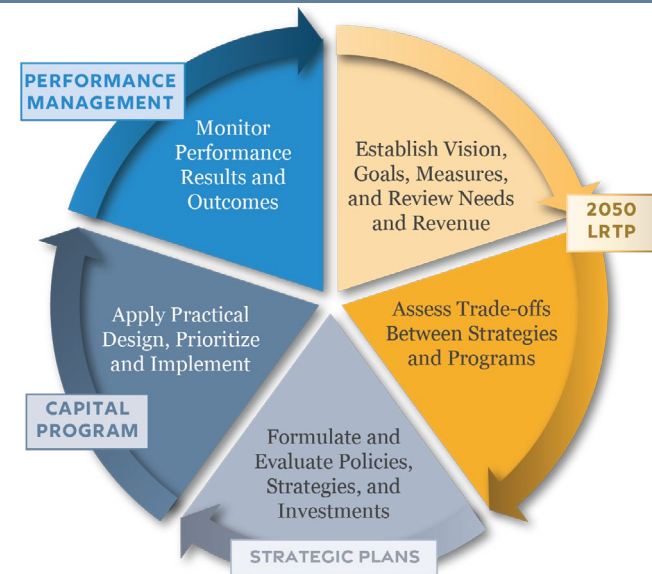


FIGURE 1. TRANSPORTATION PLANNING LIFECYCLE

The LRTP builds from prior and current planning, positions WVDOT to manage internal and external factors, provides a guide for short- and long-term actions, fosters WVDOT staff ownership of decision making and resources, and creates an environment for implementation.

The **1. STATE OF THE SYSTEM** starts the entire planning process by providing an understanding of the system. **2. TRENDS, DRIVERS, AND OPPORTUNITIES** look forward into future trends impacting transportation. **3. MULTIMODAL NEEDS, REVENUES, AND PRIORITIES** investigates the differences between needs and revenues to develop **4. POLICIES, STRATEGIES, AND TRADE-OFFS** that guide constrained resources and focus decision making. The **5. IMPLEMENTATION PLAN** specifies how to execute the plan and measure and communicate benefits.



FIGURE 2. STEPS OF THE 2050 LRTP PLANNING PROCESS

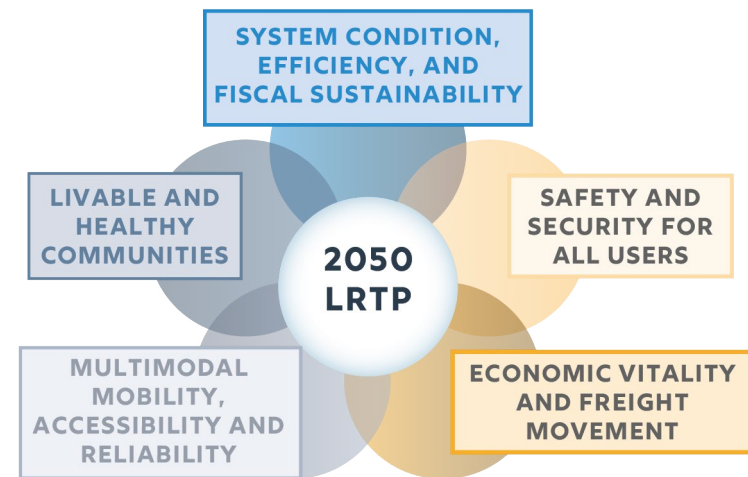


FIGURE 3. 2050 LRTP GOAL SUMMARY

What Did We Learn from the Planning Process?

1. STATE OF THE SYSTEM summarizes current transportation plans and practices across all modes to identify system characteristics and present viewpoints establishing the 2050 LRTP's Vision and Goals. Understanding how the transportation system impacts West Virginians' quality of life and the local economy is fundamental to planning a system serving all users.

2. TRENDS, DRIVERS, AND OPPORTUNITIES within West Virginia's current and future demographic, environmental, economic, and technological context considers how West Virginia's future transportation system can grow and evolve along with opportunities from emerging trends while being resilient to external changes.



FIGURE 4. IDENTIFYING TRENDS AND OPPORTUNITIES

3. MULTIMODAL NEEDS were gathered from diverse expert input, current statewide, corridor, and regional plans, and decision support tools, enabling needs reporting by time periods, source, improvement type, and eligible funding category. The cost to modernize transportation assets, sustain statewide programs, address capacity constraints, and bridge multimodal gaps were linked to broader statewide goals like improving access to public health, job centers, and destinations.

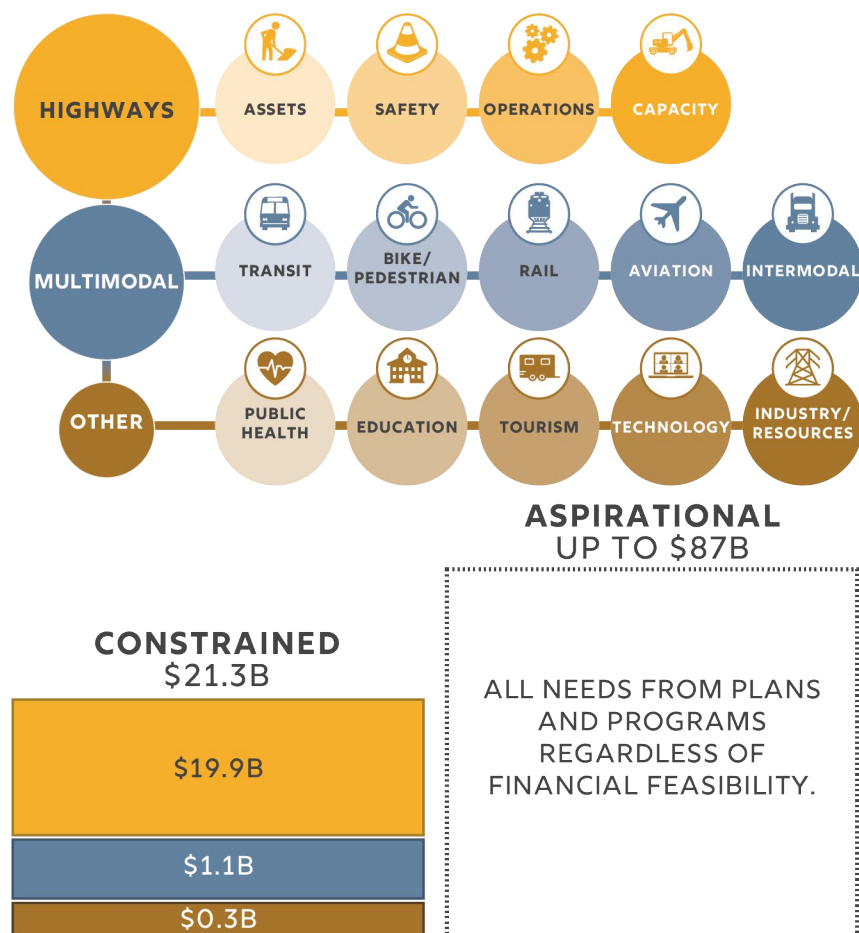


FIGURE 5. MULTIMODAL NEEDS ASSESSMENT

3. REVENUES come from a combination of State and local taxes like Motor Fuel Taxes (MFT) on fuel purchases and privilege taxes on vehicle purchases, transportation fees such as vehicle registration and license fees, as well as Federal funds to collectively operate, maintain, and improve West Virginia's public roadways. These revenues are constrained by operational expenses and agency administration costs and then compared against needs. When comparing current estimated expenses to revenues, revenues are not enough to address needs, thus producing a revenue gap.

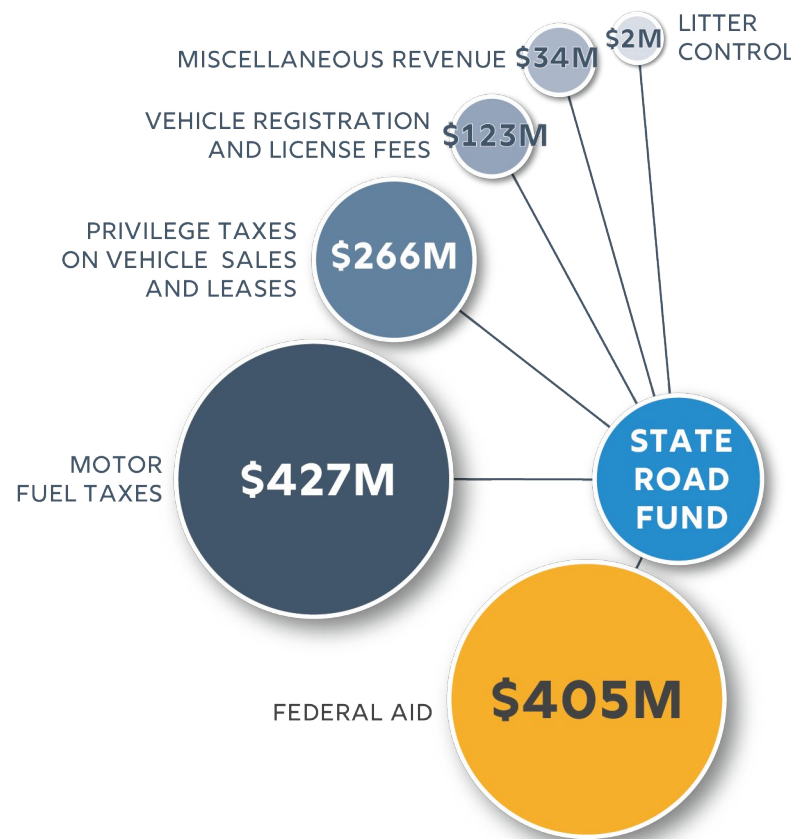


FIGURE 6. ANNUAL REVENUE IN FISCAL YEAR 2020: \$1.257 BILLION (AUDITED)

The LRTP includes a Financial Plan that presents the revenue information and impacts on revenue from future scenarios like more electric vehicles, macro-economic changes in travel activity, increased revenue from freight growth, and anticipation of unexpected events. Further adjusting revenue sources, like indexing MFT rates to inflation, combined with introducing new taxes, such as a real estate sales tax, show potential to address increasing needs, close the revenue gap, and establish **PRIORITIES** for investment decisions.

Focusing on constrained needs exceeding constrained revenues helps the LRTP identify investment portfolios and develop **4. POLICIES, STRATEGIES, AND TRADE-OFFS** into decision-based systems that guide constrained resources and focus decision making on the State's most pressing transportation needs. The combination of the Needs Assessment and the Revenue Forecast supported development of the **GAP ASSESSMENT WITHIN STEP 4.**

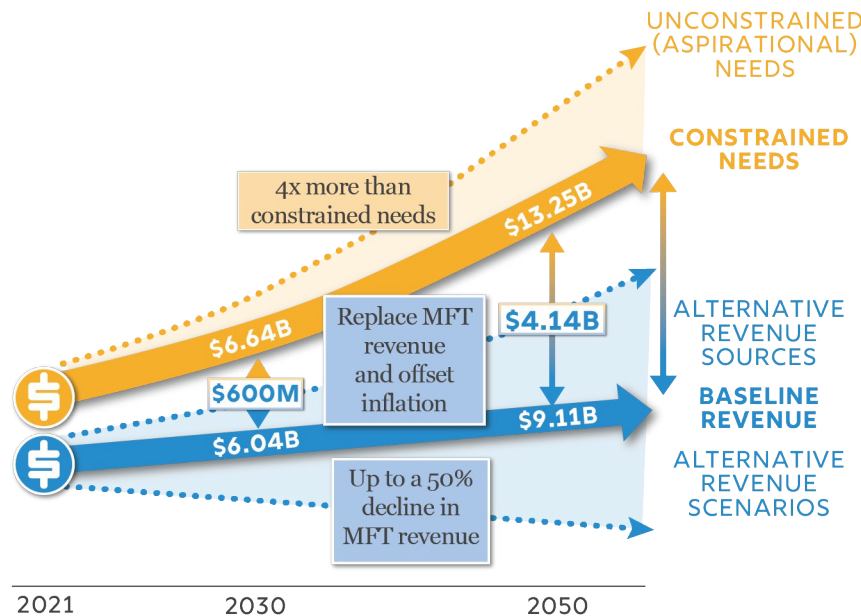


FIGURE 7. 2050 LRTP GAP ASSESSMENT

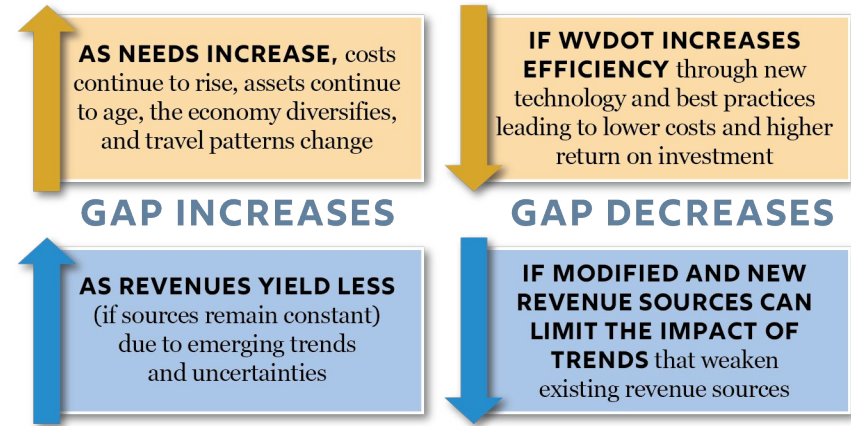


FIGURE 8. ASSESSING WVDOT'S FUTURE NEEDS AND REVENUES

Knowing changes to revenue streams take time to approve, and also require legislative/voter approval, the LRTP focuses attention on **23 Strategies** to address multimodal system needs within five portfolios: **Preservation, Performance, Innovation, Diversify, and Access.** **Strategies** encompass **policies (to guide strategic decisions), practices (to increase efficiency and improve performance), partnerships (to coordinate investments with State goals), and technology (to enhance program delivery and asset management).** **Actions** proposed within each strategy are prioritized through **Trade-offs** to consider readiness, resources, risk and institutional barriers, and acceptance/willingness to implement.

The **5. IMPLEMENTATION PLAN** specifies how to execute the plan by timeframe to measure and report **implementation progress and benefits.** **Section 9** details the **highest priority actions** for implementation over the next five years to meet immediate needs and spur development of other priority actions to 2030 and beyond.



FIGURE 9. DEFINING PROPOSED INVESTMENT PORTFOLIOS

Focusing first on the **highest priority actions**, many of which are already underway, targets limited resources to address West Virginia's most pressing transportation issues. **High** priority actions could be implemented within the next 6-10 years with continued support and are not as urgent. **Long-term** actions are projected to take longer than 10 years to implement requiring more partnerships, resources, and time to develop.

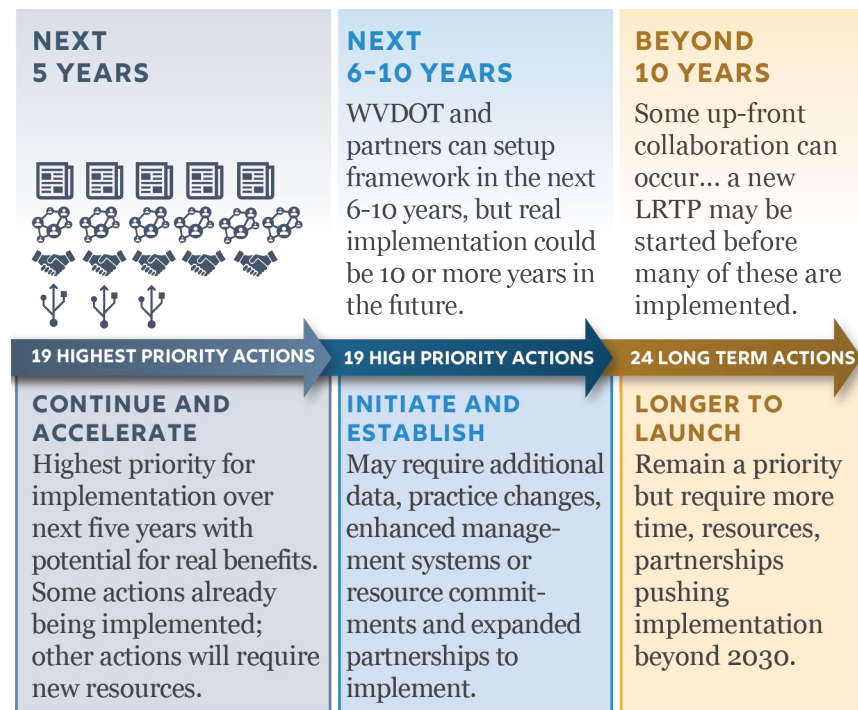


FIGURE 10. ACTIONS GROUPED BY TIMEFRAME

Engagement with our partners, stakeholders and the public is indispensable throughout the 2050 LRTP planning process. Shaping the 2050 LRTP around input ensures that all voices help build the plan, which is especially important to accomplish **IMPLEMENTATION**. The COVID-19 pandemic led us to offer ample virtual outreach opportunities to engage residents and stakeholders across the planning process. A plan website alongside an open email address to receive constant input keeps citizens part of the process, allowing them to ask questions and voice concerns. The 2050 LRTP is West Virginia's plan with West Virginia's voice.

Visit transportation.wv.gov for full details.

Send questions, concerns, and feedback to DOT2050@wv.gov. Comments are welcome through August 14, 2021.



SKYLINE OF CHARLESTON



FOUNDATION FOR LONG-RANGE PLANNING

Why are we doing this?

What is our approach and how did we work with our partners?

What are our objectives and how does the plan fit into other WVDOT processes?

How did the planning process address Federal requirements?

WEST VIRGINIA DOT'S NEW STATEWIDE LONG-RANGE TRANSPORTATION PLAN HELPS POSITION WVDOT AND THE MULTIMODAL SYSTEM IT MANAGES TO FURTHER SUPPORT WEST VIRGINIA'S ECONOMY, ENHANCE QUALITY OF LIFE, FOSTER SAFE AND RELIABLE TRANSPORTATION OPTIONS, AND BETTER CONNECT WEST VIRGINIA RESIDENTS AND BUSINESSES TO OPPORTUNITIES.

The statewide multimodal long-range transportation plan (LRTP) helps the West Virginia Department of Transportation (WVDOT) be proactive in the face of economic and demographic changes and uncertainties, like changing transportation energy sources and technology shifts. By anticipating these changes and understanding how it may impact transportation, the LRTP can guide future transportation policies and investments.

WVDOT developed the prior LRTP in 2009 and finalized it in 2010. A lot has changed in transportation nationally and in West Virginia over the last decade, making this an opportune time to update the plan. Significant changes since 2010 include:

- **Two Federal surface transportation bills**, Moving Ahead for Progress in the 21st Century (MAP-21) and Fixing America's Surface Transportation (FAST) Act, creating new funding programs and planning requirements.
- **Expansive new transportation investment programs in West Virginia** including the Roads to Prosperity program and Secondary Roads Maintenance Initiative.
- **The advent of new transportation mobility options** such as ridesharing programs (Uber, Lyft, etc.) and bike share programs (and other micromobility options like electric scooters currently found mostly outside of West Virginia).
- **Evolving transportation technologies**, ranging from autonomous technologies like drones, new vehicle technologies including plug-in hybrid and battery electric vehicles, and new high-speed travel technologies like Hyperloop.
- **New priorities, particularly in the areas of equity, resiliency, and accessibility**, as it relates to rural area access to important destinations and access to broadband internet.

The value of long-range planning and planning for uncertainty was elevated during development of this plan, while observing the impacts of the COVID-19 pandemic on our daily life and the transportation system.

The plan provides a 30-year blueprint to fund and improve the preservation, management, and expansion of West Virginia's multimodal transportation system. To build this blueprint, WVDOT worked with transportation stakeholders, coordinated with Federal partners, and sought input from West Virginia residents across the five study phases presented in Figure 11 throughout 2020 and 2021.



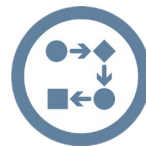
STAKEHOLDER AND PUBLIC ENGAGEMENT ensures that the planning process is transparent and accessible to stakeholders, residents, and businesses, offering regular virtual opportunities for input to steer plan outcomes.



The **STATE OF THE SYSTEM** provides a platform for the rest of the plan by detailing the performance of West Virginia's multimodal transportation system, including the goals, plans, programs, and partnerships that will shape system preservation, operations, and expansion activities.



TREND, DRIVERS, AND OPPORTUNITIES focuses on demographic, economic, technology, environment, and transportation funding trends shaping transportation through 2050. Cross-cutting considerations like education, equity, public health, and resiliency connected transportation to broader society topics.



FUTURE NEEDS, REVENUES, AND PRIORITIES synthesizes the conclusions drawn from the prior two phases to help compare scenarios of future transportation revenues against prioritized multimodal transportation needs.



POLICES, STRATEGIES, AND TRADE-OFFS considers the differences between future transportation revenues and multimodal investment priorities to identify the most critical policies, programs, and projects to meet West Virginia's transportation goals.



The **IMPLEMENTATION PLAN** highlights the key plan outcomes and recommendations and identifies near term steps that WVDOT and its partners can take to propel and manage plan implementation over the next decade.



FIGURE 11. STEPS OF THE PLANNING PROCESS

The 2050 LRTP is a statewide multimodal plan, representing the collective responsibility of WVDOT and the more than 6,000 men and women who work in the Division of Highways; Division of Motor Vehicles; Division of Public Transit; the WV Parkways Authority (WV Turnpike); the State Rail Authority; and the Aeronautics Commission.

Given the broad focus of WVDOT activities in providing essential services in transportation, tourism, and economic development, the 2050 LRTP accounts for the diversity of the transportation system that WVDOT manages and the people and economy it connects.

Mission Statement:

It is the mission of the West Virginia Department of Transportation to create and maintain for the people of West Virginia, the United States, and the world a multimodal and inter-modal transportation system that supports the safe, effective, and efficient movement of people, information, and goods that enhances the opportunity for people and communities to enjoy environmentally sensitive and economically sound development.

The LRTP accounts for important WVDOT objectives through putting the Mission Statement into practice and planning for:

- Safety and protection of citizens through modern operating standards for our highways, rail, and airport facilities and providing licenses and permits for drivers and motor vehicles.
- Transportation services including support of public transit, railway operation and maintenance, airport and river port development, and highway construction and maintenance.
- Community and economic development through accessible roads, transit services, rivers, railways and airports and support for the artisan community through Tamarack and other development initiatives.
- Revenue generation through the highway trust fund, air, railway, and waterway fuel funds, tolls and concession fees, fareboxes, and local funding matches.
- Information and education through driver education, travel information, safety guidance, and public involvement in transportation planning and continuing education.

LEADERSHIP TEAM – Made up of leaders across each WVDOT Division, the Leadership Team reviewed Plan findings and provided direction that helps ensure the Plan supports WVDOT’s mission and creates a platform to support West Virginia’s economy and quality of life.



POLICY AND TECHNICAL TEAM – Made up of subject matter experts across WVDOT, MPOs, RPDCs, Federal partners, and partner state agencies, the Policy and Technical Team provided direction, insight, data, and best practices that helps WVDOT create a comprehensive and actionable Plan.

To follow the WVDOT mission statement and objectives, the LRTP development process enlisted the support of two stakeholder groups representing a diversity of statewide, regional, and local perspectives. These groups provided critical input through four rounds of meetings, three surveys, and interviews that ultimately guided development of the 2050 LRTP.

The planning process also involved engagement with West Virginia residents, business owners, interest groups, and other interested parties through virtual public meetings. A regularly updated LRTP website provided all draft materials and meeting information as well as served as a forum to continually collect and address comments. The impacts of the COVID-19 pandemic restricted interaction directly with the public, however through the use of social media, virtual meetings, and the website, WVDOT and its partners made sure people were aware of the process, had access to information, and were able to ask questions and provide comments.

The 2050 LRTP plays an important role in connecting transportation planning to WVDOT’s strategic planning, programming, program and project delivery, and performance management activities. This cycle, depicted in Figure 12, is consistent with the overall new direction developed as part of recent Federal surface transportation bills directing States to implement a performance-based planning and programming process.

The 2050 LRTP establishes the statewide long-range plan vision, goals, measures, and understanding of needs to facilitate discussions on transportation priorities and actions that WVDOT can take to be more efficient while continuing to meet its responsibilities and helping advance West Virginia’s economy and quality of life.

The 2050 LRTP goes the next step and identifies actions that WVDOT and its partners can take over the next decade to turn the findings of the LRTP into a reality.

This step, presented in Section 9 of this Plan Report, creates the platform for ongoing strategic planning which identifies specific policies, programs, and projects for future funding and implementation.

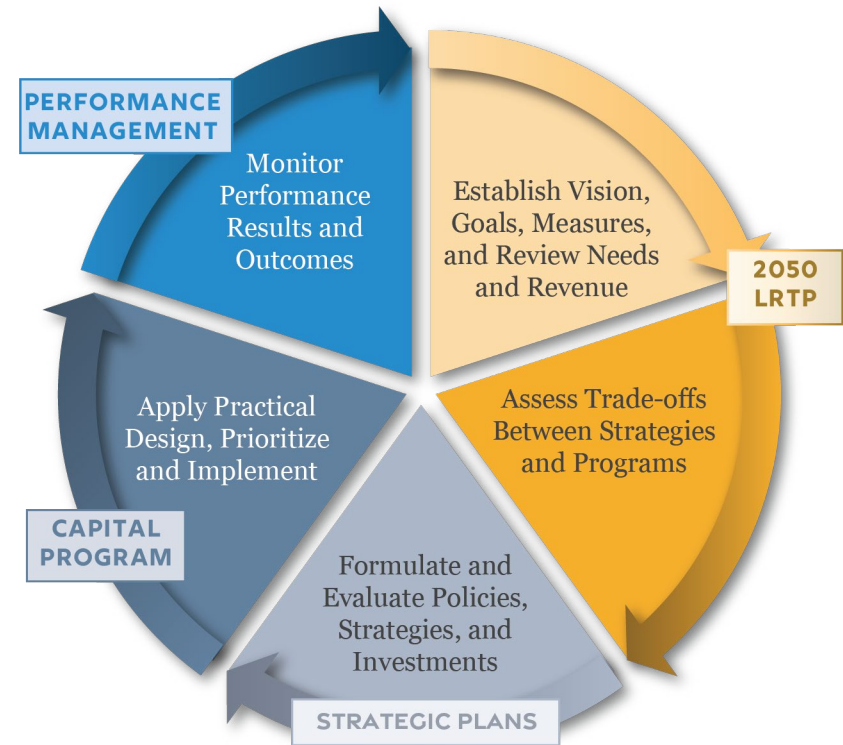


FIGURE 12. TRANSPORTATION PLANNING LIFECYCLE

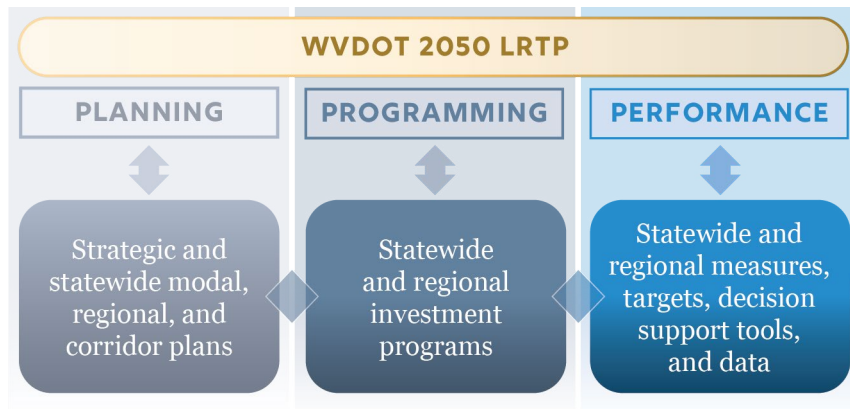


FIGURE 13. FAMILY OF PLANS, PROGRAMS AND PERFORMANCE

The 2050 LRTP creates a platform to enable ongoing and future planning, programming, and performance management activities connecting to the overall agency mission, vision, and goals, while also supporting the trends, goals, needs, and actions. The 2050 LRTP is the policy plan to guide and develop the WVDOT “family of plans” (see Figure 13), creating unified, consistent, and strategic actions to coordinate system-wide, mode-specific regional and corridor plans.

The WVDOT 2050 LRTP development approach is consistent with USDOT requirements as specified through rulemakings as part of MAP-21 and the FAST Act. Figure 14 provides a list of these requirements with links to the Federal regulations and information on where to find the WVDOT response as part of this 2050 LRTP Plan and other supporting documents available on the WVDOT 2050 LRTP website.

FIGURE 14. REQUIREMENT SUMMARY

REQUIREMENT FACTORS	PLAN RESPONSE	PLAN SECTION
WV carries out a continuing, cooperative, and comprehensive performance-based statewide multimodal transportation planning process.	- Multimodal needs and revenue forecasts consistent with WVDOT federally compliant plans and MPO Metropolitan Transportation Plans. - Performance implications, opportunities and challenges of demographic, environmental, economic and technology trends on WVDOT resources. - Continuous engagement with WVDOT planning partners throughout 2050 LRTP development. - Performance responsive strategies, actions against future uncertainties.	2-9
The WV transportation planning process provides for consideration and implementation of projects, strategies, and services that address 10 planning factors :	- Vision, goals and objectives consistent with federal planning factors and linked to transportation supportive state economic, environmental, public health, education and tourism goals. - Strategies, actions enhance multimodal system asset, access connectivity, safety, resiliency, stormwater impacts, tourism, and operations and management.	2, 6, 9
WV’s transportation planning process uses a performance-based approach to transportation decision-making .	- Multimodal needs forecasts consistent with WV MPO fiscally constrained MTPs, WVDOT system, mode-specific demand based plans and WVDOT condition driven asset management systems. - Resulting strategies, actions through technical analyses and engagement lead to prioritized solutions to address system performance gaps.	3-6, 8, 9
WV applies asset management principles and techniques consistent with the State Asset Management Plan, the Transit Asset Management (TAM) Plan, and Public Transportation Agency Safety Plan (PTASP) when assessing transportation investment decisions.	- Needs forecasts, revenue allocations for Highway System (NHS), Non-NHS and Turnpike consistent with 2019 TAMP. - Transit service, asset and safety needs review through Transit TAM, PTASP and Division of Transit.	3, 5, 6, 8, 9

REQUIREMENT FACTORS	PLAN RESPONSE	PLAN SECTION
WV's planning process is consistent with the development of applicable regional ITS architectures and the coordinated public transit-human services transportation plan .	- Maintenance, expansion of Active Transportation Management (Traffic Management Center, Dynamic Message Boards, Closed Circuit Cameras, Road Weather Information Systems) consistent with statewide deployment plans. - Statewide transit service needs through Division of Transit and regional/local transit operator input.	3, 6, 7-9
WV followed its documented public involvement process to provide opportunities for public review and comment, provided for the participation of nonmetropolitan local officials , and develop the LRTP in consultation with the Tribal government and the Secretary of the Interior .	- COVID-19 restrictions directed virtual outreach through public meetings, social media, surveys and legal notices through WVDOT website, email and distribution lists. - Outreach targeted key MPO, RPDC (non-metropolitan), state agencies, advocacy groups and other stakeholders. No federally or state recognized tribes in West Virginia – notifications implied in press release.	7
The LRTP has a minimum 20-year forecast period from the time of adoption.	30-year LRTP development and assessment segmented in 10-year (2020-2030) and 20-year (2031-2050) horizons.	3-6, 8, 9
The LRTP includes elements and connections between various modes and addresses intercity travel.	- Multimodal needs forecasts through WV MPO MTPs, WVDOT source materials, WVDOH modal expert input and stakeholder input - Strategies, actions propose more multimodal, intermodal connection opportunities through state, local and private operators.	3, 6, 7-9
The LRTP includes strategies to ensure the preservation and most efficient use of the existing transportation system .	Strategies, actions promote greater cost-effective, technology-driven regional mobility management systems to discover, plan and access fixed route and demand response services.	1-9
The LRTP references, summarizes, or contains applicable studies, reports, and plans that were relevant to the development of the LRTP.	Source material references/links to national, state, local related plans, studies, reports and research papers throughout 2050 LRTP and within specific White Papers, Fact Sheets and forthcoming technical documentation on WVDOT website.	1-9
The LRTP integrates the priorities, strategies, or projects contained in the HSIP, the HSP, and the Public Transportation Agency Safety Plan.	Safety and transit related strategies, actions prioritized through review of WVDOT federally compliant plans, future needs, resources and greater state, local law enforcement and local operator coordination.	3, 6, 8, 9
The LRTP includes a security element that incorporates priorities, goals, or projects set forth in other transit safety and security planning programs.	- Vision, goals, objectives support safety and security for motorized and non-motorized users. - Strategies, actions address updates to emergency management plans, state/local mobility management and MPO MTPs inclusive of transit system safety, security commitments.	2, 3, 6, 8, 9
The LRTP includes a description of the federal performance measures and targets used in assessing the performance of the transportation system, and a system performance report .	- System Performance Report (SPR) presents baseline, current performance and targets for 16 performance measures. The SPR documents trends driving WVDOT's performance-based approach to multi-modal transportation planning and decision making. - Trade-offs between highway assets, expansion, safety and non-highway modes inform priority Plan strategies, actions.	6, 8, 9
WV developed the LRTP in cooperation with the MPOs and nonmetropolitan local officials , and in consultation with the Tribal government and the Secretary of the Interior and State, Tribal, and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation.	- COVID-19 restrictions directed virtual outreach through public meetings, social media, surveys and legal notices through WVDOT website, email and distribution lists. - Outreach targeted key MPO, RPDC (non-metropolitan), state agencies, advocacy groups and other stakeholders. No federally or state recognized tribes in West Virginia – notifications implied in press release.	7
The LRTP includes a discussion of potential environmental mitigation activities , developed in consultation with Federal, State, regional, local and Tribal agencies.	- Vision, goals, objectives support protection of national environment and mitigation of transportation impacts. - Strategies, actions prioritize stormwater and roadside management to address system vulnerabilities and proactive responses to slip failures.	2, 8, 9
The LRTP may include a financial plan that demonstrates how the adopted LRTP can be implemented.	2050 LRTP Finance Plan details short and long term revenue trends, forecasts and scenarios for multi-modal needs comparison.	4



WEST VIRGINIA'S LONG-RANGE PLANNING CONTEXT

*How does today's system and current and evolving trends impact planning?
Where do we want to go in the future, and how do we intend to get there?*

STATE OF THE SYSTEM

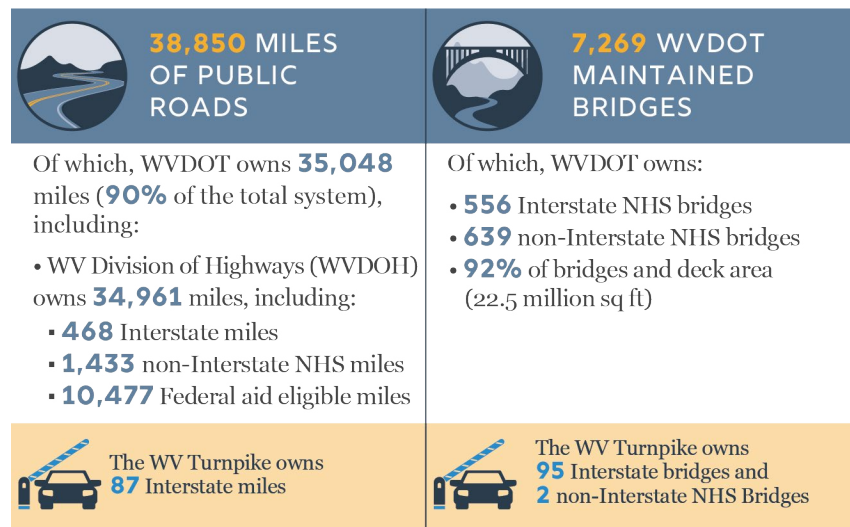
The first step of the 2050 LRTP process required compiling research from current transportation plans and practices for all modes throughout West Virginia. The results are summarized in the [State of the System \(SOTS Fact Sheets\)](#), which identifies characteristics of our current transportation system and the latest thinking on priorities and plans. The State of the System creates the platform to establish the vision and goals for the 2050 LRTP, outlines how the transportation system impacts West Virginians' quality of life and the local economy, and is the foundation to build out portfolios and strategies later in the planning process.

WVDOT manages the sixth (6th) largest state-maintained highway network in the United States. Residents (as the 40th most populous State), commercial vehicles moving goods, and visitors through our growing

tourism economy collectively generate funds to help WVDOT take care of 35,048 miles of public roads and 7,269 bridges (Figure 15). In addition to maintaining the roads and bridges, WVDOT also maintains and operates support systems and facilities like signs, lights, sidewalks and paths, maintenance facilities, and a fleet of equipment vehicles. WVDOT and each modal agency (Aeronautics, Highways, Parkways, Transit, and Rail) are responsible for maintaining safe and reliable access to destinations for all types of trips, working with partners to ensure requirements are met, and seeking input from citizens and private interests to deliver an integrated multimodal transportation system. WVDOT's multimodal transportation system includes:

- 2,312 miles of railroad.
- 13 freight railroads in operation and 274 miles of navigable waterways.
- 299.8 million tons of freight (\$140.0 billion in value) moved in 2018 within, out of and into West Virginia.

- 2,310 miles of pipeline.
- Over 5,000 miles of trails to support recreation.
- 7,200,000 public transportation passenger trips in 2019 on transit systems serving 37 of 55 counties.
- 13 passenger rail stations providing access to Amtrak service on the “Capitol Limited” and “Cardinal” routes and three stations providing access to Maryland Rail Commuter (MARC) service.
- 34 public-use airports and seven commercial service airports.



Note: All miles presented as centerline miles. All mileage stats from FHWA 2018 Highway Statistics series.



FIGURE 15. WEST VIRGINIA DIVISION OF HIGHWAYS AND TURNPIKE SYSTEM ASSETS

THINKING FORWARD: TRENDS, DRIVERS, AND OPPORTUNITIES

[Fact sheets and white papers](#) summarize West Virginia’s demographic, environment, economy, and technology context, each identifying trends, drivers, and opportunities shaping the transportation planning process. Transportation is the backbone of West Virginia’s economy, driving employment to power innovation while meeting social needs and protecting natural resources. West Virginia’s future transportation system will need to create opportunities from emerging trends while being resilient to external changes.

DEMOGRAPHICS

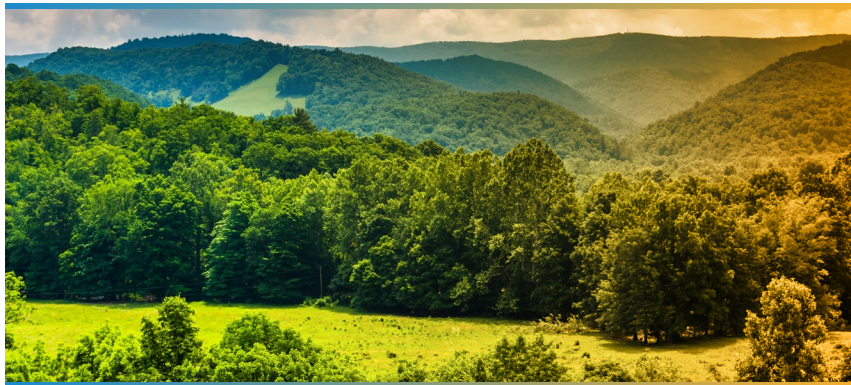


Understanding and meeting demographic needs is essential to providing a multimodal transportation system, and as population changes, transportation should be ready to maximize access to opportunity. Demographics and transportation are inextricably linked, and understanding social changes ensures transportation services meet demand. Declining populations in many West Virginia communities has created transportation funding challenges from flat or declining local and State tax revenues, while younger residents move to urban areas and demand emerging transportation options. West Virginians are also aging, and these residents require on-demand mobility options when they become unable to drive themselves, especially in rural areas, for daily activities like grocery shopping and medical appointments.

Improving transportation connections in more rural, remote areas will enhance access to education, public health services and bridge gaps in local communities like access to healthy food options to reduce obesity and food deserts. Using transportation assets to expand broadband access across rural communities improves both education and economic conditions. West Virginia's investment in connected infrastructure will create widespread opportunities across transportation, education, employment, and public health that will improve the quality of life for all citizens, one person at a time.

Investing in safe and dependable transportation corridors ensures reliable access to daily services. Safe and dependable corridors mean comfortable bus stops with on-time arrivals, well-maintained roads, well-lit intersections, visible pedestrian crossings, and structurally-sound bridges. Leading with physical improvements through State infrastructure projects paves the way for improving access to jobs, schools, businesses, and health care facilities. Dependable transportation services amplify customer confidence and loyalty by providing reliable physical access between goods, services, and people.

ENVIRONMENT



Transportation assets and systems depend on land and resources to function; therefore, environmental management and protecting resources are essential to preserving West Virginia's natural and built environments. Sustainable improvements to transportation assets also provide

statewide social, environmental, and economic benefits. Preserving natural assets like habitats and water resources improves water and air quality and enhances stormwater management and flood mitigation, collectively strengthening biodiversity. Furthermore, enriching outdoor recreation opportunities increases tourism, economic development, and the overall well-being of residents and visitors alike.

Integrating efficient practices to maintain transportation infrastructure promotes long-term sustainability like more environmentally sensitive maintenance procedures for road treatments before and during winter weather, maintenance and cleaning stormwater management facilities, more efficient lighting that uses less energy, and using solar panels to power highway infrastructure. Enhancing West Virginia's environmental inventory mapping to better understand future transportation needs alongside environmental management will assist preparation and recovery from weather events, identifying environmental resources, and amplifying environmental resiliency. Efficiently managing environmental resources and supporting tourism opportunities leverages and preserves West Virginia's natural beauty for current and future generations.

ECONOMY



The transportation system is one of West Virginia's highest value investments and helps fuel the State economy. Economic development and transportation investment are interdependent: transportation provides

access, which moves the economy. A robust transportation system drives employment to power manufacturing, trade, and industry. West Virginia's slower economic growth relative to peer States, coupled with population and workforce declines in many communities created challenges for employers looking to expand in West Virginia. On the other hand, steady trade partners are benefitting from rising industries like pharmaceuticals and chemical manufacturing, which are shifting state-wide logistics patterns and providing new, high-paying job opportunities. Post-COVID-19 pandemic changes in employment and travel patterns necessitates a reassessment of transportation systems and services. As economic activity returns in important industries, like tourism and hospitality, new social patterns and preferences will guide transportation's future direction.

Targeting transportation investments that grow the economy strengthens West Virginia's resiliency to recessions, like piloting and testing of new transportation technologies, including autonomous vehicles, drones, and the Hyperloop. While these opportunities attract private investment, State investments must also improve efficiency and safety of the multi-modal transportation system to optimize worker access to jobs and lower logistics costs.^{1,2} Building industry and trade, while supporting existing industries, requires balancing traditional energy sources alongside new energy sources to help diversify West Virginia's economy. Changes in logistics affects transportation, manufacturing, and trade, impacting the State economy and statewide relationship of supply and demand with local, neighboring, and global markets.

Economic resilience is created from continued economic opportunity necessary for public, private, personal, and community income growth, funding public services, supporting senior citizens, and developing the future workforce. Improving job access through transportation will especially help residents in disadvantaged communities, alongside strong

workforce development and employee retention efforts. Nurturing emerging top industries helps to create workforce opportunity and reduce unemployment. Continued economic opportunity is necessary for income growth to fund public services, support senior citizens, and amplify the workforce. Together, these efforts can help grow and retain the State's educated workforce and create widespread opportunity to improve the quality of life for all West Virginian's.

TECHNOLOGY



Transportation technology is rapidly evolving, and technology can address existing and future transportation challenges across safety, mobility, efficiency, and environmental quality. Individual technologies have widespread implications on land use, urban design, equity, and environmental sustainability in addition to transportation, and leveraging emerging technologies will help to advance West Virginia's economic vitality and global competitiveness.

Prioritizing and understanding the benefits of emerging technology positions West Virginia to leverage future opportunities, stretch limited resources and adapt transportation policies, practices, and decisions to support state goals. West Virginia Division of Highways (WVDOH) is

¹ Wood, Molly. "Five Reasons for a Self-Driving Car Slowdown." WV Public Broadcasting. January 30, 2018.

² WVU Research Gives Self Driving a Boost." September 19, 2017.

linking technology within ongoing expansion, maintenance, and operations of the multimodal transportation system, including implementation of the state directed “Dig Once” policy to extend broadband through WVDOT right-of-way.

Detailed in the [Gap Assessment](#), WVDOH’s recent drone pilot supports “Build, Scale, Innovate” principles to assess maintenance stockpile inventories resulting in over \$300k in yearly savings. Similar pilots for state-wide asset management and hazard identification can address safety, mobility, and infrastructure condition and environmental needs yielding untapped cost savings. Connecting “smart” infrastructure devices like roadside devices, detectors with corridor and network intelligent transportation management systems can relay travel conditions in more areas of the state improving performance through major events.

West Virginia’s topography and extensive road network provide diverse conditions to test automated vehicle (AV) and connected vehicle (CV) technologies on heavily traveled truck corridors and less traveled rural routes. Ongoing research of AV/CV testing with neighbor states and through national studies highlights data sharing and enabling technology investment opportunities which better position West Virginia to respond to rapidly changing industry changes in an increasingly competitive landscape.

Expanding current technology initiatives combined with an eye towards future opportunities builds a “technology awareness” throughout WVDOT to coordinate, streamline and realize the full potential of internal technology opportunities and facilitate increased external partnerships to prioritize, deliver and operate WVDOT’s programs.

VISION, GOALS, AND OBJECTIVES

The 2050 LRTP goals and objectives guide WVDOT all the way through plan implementation ([Vision, Goals, & Objective Fact Sheet](#)). Goals define the desired result, while objectives support a specific goal and provide additional details or strategies for achieving each goal. Both provide a roadmap toward West Virginia’s future transportation vision and give WVDOT and transportation partners measurable benchmarks to ensure transportation advancements keep moving forward.

GOAL 1: SYSTEM CONDITION, EFFICIENCY, AND FISCAL SUSTAINABILITY

Maintain multimodal transportation infrastructure in a state of good repair and manage lifecycle costs; efficiently deliver projects, programs, and services; and work to maintain existing funding mechanisms while exploring new alternative and sustainable funding mechanisms.



- **MAINTAIN** the existing multimodal transportation system in a state of good repair.



- **INVEST** in innovative technologies and efficient program delivery strategies.



- **EXPLORE** new and sustainable revenue options.



- **ENSURE** that WVDOT has the necessary resources to fulfill its mandate effectively and efficiently.

GOAL 2: SAFETY AND SECURITY FOR ALL USERS

Reduce transportation fatalities and serious injuries across all modes and improve the safety, security, and resilience of the multimodal transportation network for all users.



- **REDUCE** fatalities and serious injuries on the multimodal transportation system.



- **MANAGE** a resilient and redundant transportation network.



- **DECREASE** incident clearance time and recovery.

GOAL 3: ECONOMIC VITALITY AND FREIGHT MOVEMENT

Strengthen the ability of communities and industries to access national and international trade markets, retain and grow existing statewide and regional economic focus sectors, and support regional economic development that will diversify West Virginia's economy.



- **IMPROVE** intermodal freight connections.



- **EXPAND** access to economic activity centers and emerging industries/clusters.



- **ADDRESS** bottlenecks and first-mile/last-mile access.

GOAL 4: MULTIMODAL MOBILITY, RELIABILITY, AND ACCESSIBILITY

Facilitate multimodal mobility and connections for all users, allowing residents and visitors to have modal options for reliable and affordable access to opportunities, including employment, education, health care, and recreation.



- **MANAGE** recurring congestion and improve reliability on the highway system.



- **CREATE** new opportunity for access to key destinations and jobs for underserved or disadvantaged populations.



- **ENHANCE** multimodal transportation accessibility to key destinations and jobs.

GOAL 5: LIVABLE AND HEALTH COMMUNITIES

Create transportation systems that promote healthy lifestyles, operate efficiently and cleanly, protect the natural environment, and maintain access for residents and visitors to experience West Virginia's natural and cultural destinations.



- **REDUCE** emissions and mitigate environmental impacts.



- **PROMOTE** and improve bicycle and pedestrian infrastructure.



- **COORDINATE** land use and transportation decisions.



CURRENT AND FUTURE MULTIMODAL TRANSPORTATION NEEDS

*What are our current and future multimodal transportation needs?
How do our needs affect how we meet our goals and objectives?*

NEEDS ASSESSMENT APPROACH

The [Needs Assessment](#) encompasses an inventory of multimodal transportation capital, maintenance, and operating needs fundamental to the 2050 LRTP across WVDOT's publicly maintained multimodal systems, WV Parkways Authority assets within the West Virginia Turnpike, and locally managed transportation services. Managing 90 percent of the State's public road miles, most of WVDOT's financial resources go towards preserving, maintaining, rehabilitating, and replacing highway bridge, pavement, and roadside assets across challenging mountainous terrain.

While WVDOT has dedicated State and Federal revenue sources for highway maintenance, operations, and mobility, WVDOT has a mix of funding sources to address non-highway needs. Aviation and transit operators

rely on Federal grants and local contributions to manage, maintain, and improve capital and operating services. Rail improvements depend on annual recurring State appropriations, Federal formula funding and private railroad commitments. As an operator, the West Virginia State Rail Authority (WVSRA) can also fund system improvements through service revenues or bond issuance. Active transportation improvements are funded primarily through dedicated federal-aid highway programs matched with State or local funds.

Multimodal transportation needs within the 2050 LRTP are drawn from many sources to comprehensively compile needs over multiple decades. The [Needs Assessment](#) focuses on capital investment needs. Debt service, routine maintenance, staff salaries, and other expenses not directly attributable to capital costs are accounted for separately.



FIGURE 16. NEEDS ASSESSMENT INPUTS

Multiple tools and sources address and define needs across different time horizons, ultimately focusing to 2050 (Figure 16). Identifying individual needs by timeframe helps address shared statewide multimodal transportation interests across WVDOT as well as partners through active transportation, transit, rail, and aviation systems. The methodology also incorporates needs from regional stakeholders such as Metropolitan Planning Organizations (MPOs), Regional Planning Development Councils (RPDCs), Federal and State partners, interest groups, and elected officials to help meet the objectives of developing a multimodal statewide plan.

Needs Assessment results are planning-level estimates interpreted as summary, statewide level outcomes. Forecasting uncertainty complicates quantifying statewide multimodal transportation needs beyond the near future due to numerous assumptions and variables outside a single model. Highway and non-highway projects as well as asset improvement needs vary across regions based on local demand and underlying infrastructure conditions represented on a statewide scale.

The needs inventory starts from a 2020 baseline and is reported in the first 10-year, next 20-year, and complete 30-year increment to show the extent of needs by decade, tied to assumed population growth, infrastructure system needs, program expenditures (such as safety and traffic operations), and other demand- and/or project-specific improvements.

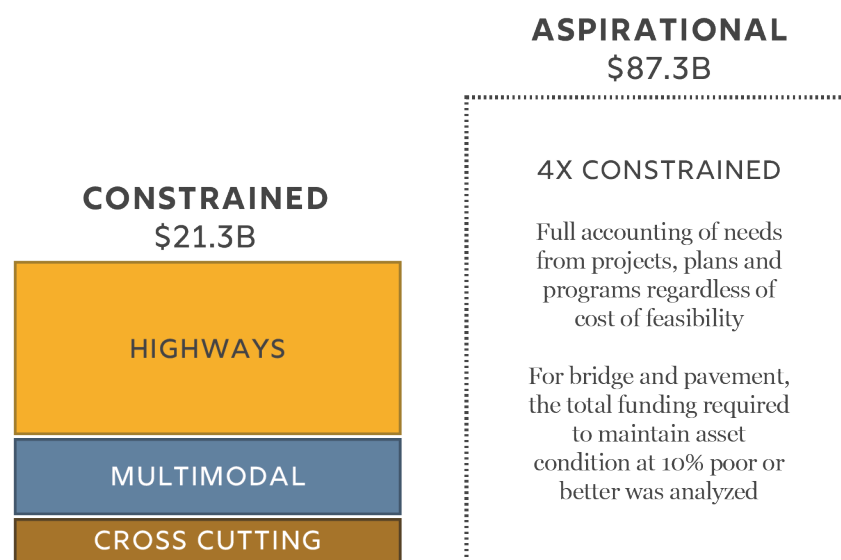


FIGURE 17. NEEDS ASSESSMENT ESTIMATES

“Low” and “high” ranges fully represent highway and non-highway needs based on multiple sources, scenarios, and assumptions bound by **constrained** versus **aspirational** benchmarks (Figure 17). The **constrained** benchmark is a tailored list of highway and non-highway mobility projects, fiscally constrained MPO Metropolitan Transportation Plan (MTP) recommendations, and outputs from WVDOT’s bridge and pavement management systems guided by a constrained revenue forecast. The **aspirational** benchmark includes the **constrained** estimates plus vision-based improvements within an unconstrained revenue forecast showing how much it would cost to meet performance goals and expand the multimodal transportation system.

Needs are estimated from a 2020 base year by mode and sub-mode across different methodologies, tools, and sources (Figure 18). In general, non-highway multimodal needs are sourced to specific system plans and/or MPO LRTPs. Supporting components of highway assets including drainage, retaining walls, signs, and lighting, fell outside the analysis and were not quantified.

MODE	SUB-MODE	METHODOLOGY	TOOLS / SOURCES	REPRESENTATION
HIGHWAY	Assets* (Bridge and Pavement)	Deterioration-based; treatment in line with revenue availability, thresholds for State of Good Repair or stated performance	Bridge and pavement management systems (BMS/PMS)	Quantitative
	Expansion (Widening, bypasses, interchanges, etc...)	Demand- and inventory-based; forecasted passenger and freight volume/capacity	MPO LRTPs, WVDOT Freight Plan, prior WVDOT LRTP	Quantitative/Qualitative
	Safety	Forecasted annualized obligations for statewide safety treatments	Expert input and trends	Qualitative
	Traffic Operations	Forecasted annualized expenses to maintain and install new infrastructure; project specific localized needs	Expert input, MPO plans	Qualitative
NON-HWY	Active Transportation, Aviation, Transit, Rail	Project specific localized needs	MPO LRTPs, WVDOT Freight Plan, WVDOT Rail Plan, WVDOT Bicycle Plan	Quantitative/Qualitative
OTHER	Highway and Non-highway projects	Project specific needs which do not fall within highway or non-highway modes	Scan of other statewide and regional plans	Qualitative

* Note: Drainage, guardrail, retaining walls, and slide assets were not included but are a significant investment for WVDOT.

FIGURE 18. NEEDS ESTIMATION METHODOLOGY BY MODE

RESULTS, FINDINGS, AND OPPORTUNITIES

The [Needs Assessment](#) encompasses strengths and limitations as well as stakeholder coordination shaping the analytical process. All **constrained** and **aspirational** need estimates are in 2020 dollars organized by mode and long-term horizon (Figure 19 and Figure 20). Viewing estimates with respect to current and changing statewide social and domestic anchors, like education and healthcare, economic and industrial growth, technological development, and financial estimates, further clarifies results and aligns future revenues to future needs ([Funding & Finance Fact Sheet](#) and [Financial Plan](#)).

CONSTRAINED (BILLIONS, LOW-END ESTIMATE)

	2020	2030	2031-2050	TOTAL
HIGHWAYS	\$6.630B		\$13.250B	\$19.880B
Bridge	\$2.170B		\$4.620B	\$6.790B
Pavement	\$2.550B		\$4.880B	\$7.430B
Highway Expansion	\$1.220B		\$2.440B	\$3.660B
Highway Traffic Ops	\$0.270B		\$550B	\$0.820B
Highway Safety	\$0.400B		\$0.720B	\$1.120B
Highway Other	\$0.20B		\$0.40B	\$0.60B
NON HIGHWAYS	\$0.360B		\$0.730B	\$1.090B
Active Transportation	\$0.120B		\$0.240B	\$0.360B
Aviation	\$0.40B		\$0.80B	\$0.120B
Transit	\$0.150B		\$0.300B	\$0.450B
Rail	\$0.50B		\$0.110B	\$0.160B
OTHER	\$0.110B		\$0.220B	\$0.330B
TOTAL	\$7.100B		\$14.200B	\$21.300B

FIGURE 19. CONSTRAINED NEEDS ESTIMATES

ASPIRATIONAL (BILLIONS, HIGH-END ESTIMATE)

	2020 2030	2031-2050	TOTAL
HIGHWAYS	\$30.740B	\$53.750B	\$84.490B
Bridge	\$7.900B	\$8.340B	\$16.240B
Pavement	\$3.920B	\$7.660B	\$11.580B
Highway Expansion	\$18.180B	\$36.350B	\$54.530B
Highway Traffic Ops	\$0.320B	\$0.640B	\$0.960B
Highway Safety	\$0.400B	\$0.720B	\$1.120B
Highway Other	\$0.20B	\$0.40B	\$0.60B
NON HIGHWAYS	\$0.700B	\$1.440B	\$2.140B
Active Transportation	\$0.230B	\$0.470B	\$0.700B
Aviation	\$0.80B	\$0.160B	\$0.240B
Transit	\$0.290B	\$0.590B	\$0.880B
Rail	\$0.100B	\$0.220B	\$0.320B
OTHER	\$0.220B	\$0.430B	\$0.650B
TOTAL	\$31.660B	\$55.620B	\$87.280B

FIGURE 20. ASPIRATIONAL NEEDS ESTIMATES

Many uncertainties like the COVID-19 pandemic, which brought sustained high rates of remote working, impacting commuting needs alongside lower car ownership further complicates estimates as travel and mode decisions change. Changing freight patterns as West Virginia relies less on extracting natural resources and more on pharmaceuticals and chemicals plus numerous unknowns, including unforeseen events, economic downturns, or other crises straining WVDOT resources also thwart estimates. However, highlighting implications behind the [Needs Assessment](#) helps guide WVDOT to establish long-term direction, shifting policy and allocating limited resources despite competing priorities.

- **Importance of Asset Management** – Bridge and pavement needs are nearly two-thirds of total transportation needs and represent a significant investment. Note, this estimate does not account for guardrails, stormwater management, retaining walls, and slide repair, which are considered as part of routine maintenance expenses within the needs assessment.
- **Future Safety Needs** – Estimates using historical funding may not represent the full scope and breadth of systemic, statewide needs, which vary by exposure and risk across West Virginia's different geographies but provides a means of quantifying these needs over time. Although fatality rates and crashes have decreased, un-helmeted, distracted driving, crashes at pedestrian crossings, and impaired driving collisions require continued focus and strategic programmatic investment.
- **Transportation Industry Changes** – Needs change over time as transportation systems become more durable and offer more travel options alongside technology. Shifts in construction materials and methods with highway operations that optimize existing capacity, extend asset life cycles, and reduce the need for future expansion projects.
- **Needs and Broader State Goals** – Associating needs to broader statewide goals and objectives highlight strategic investment opportunities sometimes easily overlooked, like including additional access to a future industrial park to support economic development as part of a highway improvement or expansion project. Transportation will continue to facilitate access to West Virginia's tourism destinations while also supporting residents who require mobility options to access essential services.

- **Cost of Doing Nothing** – Unaddressed needs will continue to cost West Virginia users more in wasted fuel, operating costs, and lost time.³ Vehicle-related expenses continue to escalate as the network falls further from a state of good repair. Since current funding sources are based on vehicle and fuel purchases instead of asset usage, and this funding is used exclusively to improve highways, adjusting current revenue sources along with adding new revenue sources will help ensure West Virginia’s transportation needs are met.

As part of the 2050 LRTP and [Needs Assessment](#), a full Needs Assessment Platform (NAP) was created to organize all compiled needs for the 2050 LRTP in a single database, enabling filtering by timeframe, mode, sub-mode, source, and other programming related categories. The database accounts for forecasts of mode-specific, program-based, and asset deterioration data drawn from discussions with WVDOT experts and from existing tools, like WVDOHs bridge and pavement management systems. The NAP can serve as a live, evolving database assisting each WVDOT division in tracking needs and informing future planning activities and programming decisions. As WVDOT continues to improve internal decision support systems and access to information for stakeholders and the public, the NAP could represent a platform for interested parties to view needs and the pipeline for future funded projects.

³ An average driver in West Virginia uses 853 gallons of fuel (15,786 miles assuming 18.5 miles per gallon). Each driver pays about \$283 in State fuel taxes annually (853 gallons x 0.332 cents/gallon), or 77 cents a day. [West Virginians for Better Transportation](#).





DOWNTOWN FAIRMONT

4

TRANSPORTATION REVENUES TO ADDRESS NEEDS

*What are our revenue sources and how will they change through 2050?
What are the risks and opportunities created by alternative scenarios and sources?*

WHERE ROADWAY FUNDING COMES FROM

West Virginia uses a combination of State and local taxes, transportation fees, and Federal funds to operate, maintain, and improve the State's extensive public roadway system (Figure 21). Further explained in the [Funding & Finance Fact Sheet](#), over 80 percent of funds go to maintenance and construction on non-tolled roadways. These roads, including

West Virginia highways, Interstate and U.S. highways, local access roads, and neighborhood streets comprise the overwhelming majority of transportation needs from personal and commercial vehicles.⁴

West Virginia receives **Federal funds**⁵ as reimbursements earmarked for bond debt service, and for federal-aid eligible work on federal-aid eligible facilities. Funding for WVDOH's non-Federal aid eligible work activities traditionally comes from the **State Road Fund**, which receives revenues from **motor fuel taxes**⁶ on fuel purchases, consumer sales, and service taxes from vehicle sales and leases (**privilege taxes**⁷), as

⁴ WVDOT 2020 Audited Financial Statements. <https://transportation.wv.gov/business-manager/Finance/Pages/FinancialReports.aspx>.

⁵ Supports Federal-aid eligible highway investments and FHWA GARVEE bond debt service.

⁶ Includes a flat rate (\$0.205/gal) and a variable rate (\$0.152/gal based on 5% of motor fuel average wholesale price). Tax Commissioner calculates an average wholesale price and variable tax rate from July through October sales data, and calculated tax rate is in effect for the next calendar year. State of West Virginia 2019 \$600M General Obligation State Road Bonds Final Official Statement (OS). Page 13.

⁷ Applied at time of sale/lease of vehicles purchases in or out of State but registered in state; charged on vehicle net sale price (6% on purchased vehicles, 5% on leased vehicles) West Virginia Legislature. WV Code. Chapter 17a. Motor Vehicle Administration, Registration, Title of Certificate, and Antitheft Provisions. <http://www.wvlegislature.gov/wvcode/ChapterEntire.cfm?chap=17A&art=3§ion=4>.

well as **vehicle registration and license fees**⁸ paid when vehicles are registered.⁹ WVDOH also receives a small amount of **miscellaneous revenue**¹⁰ from map and permit sales, tonnage fees, interest earned on investments, and a litter control fee.

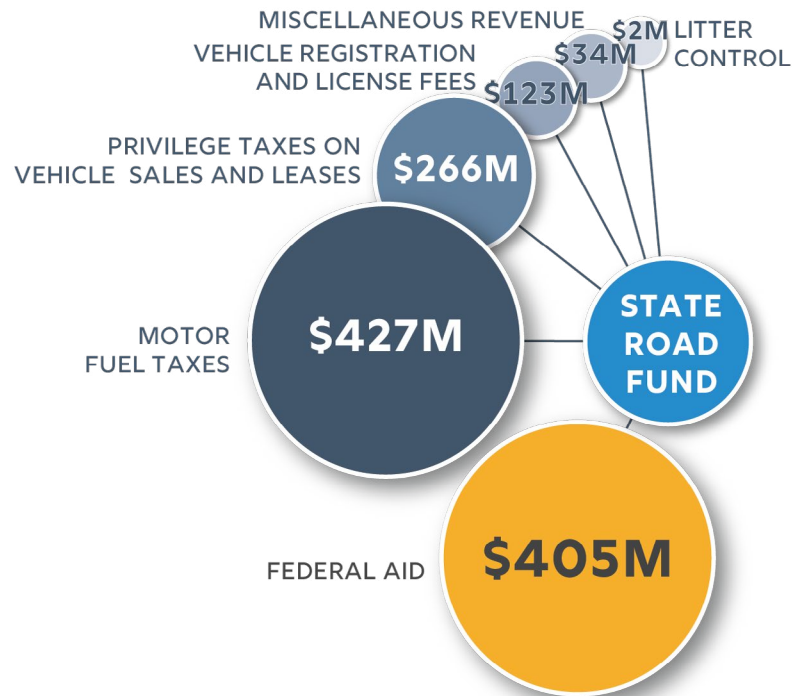


FIGURE 21. ANNUAL REVENUE IN FISCAL YEAR 2020:
\$1.257 BILLION (AUDITED)

While WVDOH does not operate the Turnpike nor pay debt service on WV Turnpike Toll Road Bonds, WVDOH maintains a partnership with the WV Parkways Authority for certain roadway and bridge capital improvement projects that allows certain funds to be interchangeable between both agencies through the Roads to Prosperity Program.¹¹ For example, proceeds from the State's 2018 General Obligation (GO) Bonds finance the I-77/I-64 Turnpike widening project through the Beckley region, while proceeds from the 2018 Turnpike Bonds are deposited into a separate fund used by WVDOH to finance projects. Proceeds from the State's 2021 GO Bonds are funding a new highway bridge and several construction projects across secondary roads statewide. Proceeds from the 2020 WV Parkways toll road bonds will pay for several road construction projects across ten counties in southern parts of the State.¹²

REVENUE DRIVERS: SHAPING FUTURE TRENDS

Travel needs and behaviors are changing, infrastructure is aging, and system costs to maintain and operate are increasing as traditional transportation revenue sources (like motor fuel taxes) fall behind needs. Many revenue drivers pinpoint trends impacting future revenues and travel and spending behaviors.

- **State of Good Repair (SOGR)** – Costs continue to increase to maintain infrastructure, resulting from overall inflation and material cost increases, to give safe and reliable transportation for future West Virginians.

⁸ Annual fee: \$51.50 registration, \$200 EV fee, \$100 plug-in-hybrid.

⁹ Page 6 and 8. West Virginia Commissioner of Highways 2018 \$78M Special Obligation Notes Official Statement (OS).

¹⁰ Litter Control Fee \$1 of each vehicle registration fee.

¹¹ The WV Turnpike is an 87-mile tolled roadway managed by the WV Parkways Authority. The Turnpike is a separate operating entity that generates its own funds for daily operations and capital improvements. Toll revenues alone cover 95% of daily operations, and users pay tolls with cash or use an E-ZPass transponder. The remaining 5% of operating revenues come from concessions sales at service plazas and tourist information centers along the Turnpike. Page 42 and 69. West Virginia Parkways Authority 2019 Comprehensive Annual Financial Report (CAFR). <https://transportation.wv.gov/Turnpike/about/investorrelations/Documents/WV%20Parkways%20CAFR%2006302019.pdf>.

¹² West Virginia raised an additional \$62.5M in proceeds for road projects from the 2021 \$200M GO bond sale (State of West Virginia 2021 \$200M General Obligation State Road Bonds) and West Virginia Parkways Authority 2021 \$333M Toll Road Revenue Bonds (West Virginia Parkways Authority). Damron, Jordan. "Gov. Justice was right...again! "Third historic road bond sale generates more than \$62.5 million in premium proceeds," says Revenue Secretary" May 19, 2021. [https://governor.wv.gov/News/press-releases/2021/Pages/Third-historic-bond-sale-complete-to-generate-more-than-\\$200-million-for-Roads-To-Prosperity-program.aspx](https://governor.wv.gov/News/press-releases/2021/Pages/Third-historic-bond-sale-complete-to-generate-more-than-$200-million-for-Roads-To-Prosperity-program.aspx).

- **Economic Changes** – Shift in freight movement as natural resource extraction industries decline while biotechnology and chemical manufacturing increases.
- **Addressing Demographic and Social Changes** – Continued aging of West Virginians outpaces birth rates and new residents, while home and auto ownership decisions possibly change.
- **Post Pandemic Travel** – COVID-19’s short and long-term effects on transportation revenue and travel.
- **More Demand for Multimodal System Development** – Benefits of multimodal systems supports West Virginia’s strong tourism, decreases air pollution and congestion, and provides mobility for aging residents as well as disadvantaged populations.
- **Unforeseen Emergencies** – Infrastructure repair costs and the economic impacts from more frequent severe weather events or other unanticipated disasters.

REVENUE RISKS: WHAT ELSE TO WATCH?

In addition to insufficient Federal funding from stagnant fuel taxes, other risks could arise affecting revenues and the revenue structure as the economy and transportation both shift and diversify while transportation technology, personal preferences, and behavior patterns continue to change.

- Growing demand for urban multimodal options and less personal vehicle ownership (or shared/on-demand arrangements).
- General fund transfers offer a temporary patch insufficient for long-term funding stability and safety.
- Bonding creates value today but restricts future spending opportunities.
- Increase in alternative fuel vehicle market share and a decrease in fuel tax receipts relative to travel demand and vehicle ownership.

FORECASTING REVENUES

Broad changes in population, behavior, spending, business, industry, and travel are impacting transportation revenues and overall economic health. Near and far term uncertainty creates both risks and opportunities for existing revenue sources. As detailed in the [Financial Plan](#), the 2050 LRTP uses a **Baseline Forecast** as a platform to further explore **Alternative Revenue Scenarios** and **Alternate Revenue Sources** through 2030 and 2050 (Figure 22).

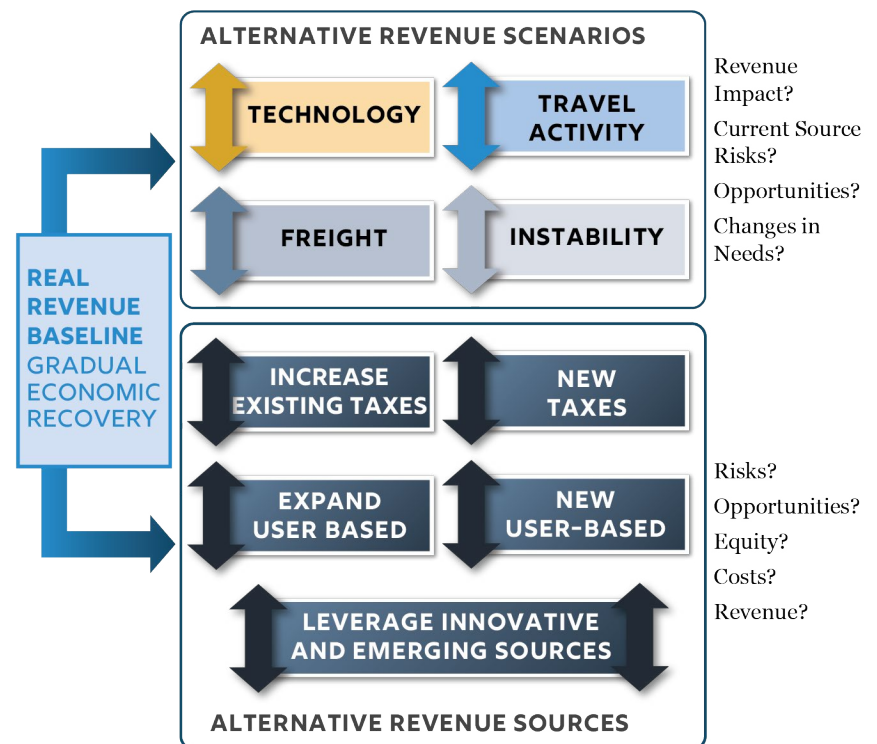


FIGURE 22. ORGANIZATION OF THE FINANCIAL PLAN

Analyzing multiple population forecasts helped reach a single consensus **Baseline Forecast** consistent with an economic recovery in West Virginia that stabilizes West Virginia's population decline and then introduces moderate growth through 2050. The **Baseline Forecast** tested these revenues against basic operating expenses to determine constrained revenues, which include the total funding left over for capital investments after meeting debt service requirements as well as regular agency administration costs and routine roadway operations and maintenance costs. Testing assumptions on how macroeconomic changes in West Virginia, including total population, could impact future revenue guides financial planning.

All revenues, like needs, are represented in constant 2020 dollars, and the **Financial Plan** takes the **Baseline Revenue** forecast two directions (Figure 23), through 2030 and 2050, to explore the potential:

1. Impact of **Alternative Revenue Scenarios** (or **macroeconomic futures**) on existing revenue sources, and
2. Modification and/or addition of revenue **sources** (**Alternative Revenue Sources**) to raise new funding to support growing needs.

The findings include:

- Changing passenger and freight travel patterns can both decrease or increase revenues from existing sources. Many impacts rely on macroeconomic patterns and private investment outside of WVDOT's control.
- Aligning the existing motor vehicle fuel tax rate with inflation helps mitigate inflationary risks in construction costs and positions WVDOT to better meet changing needs.
- Incorporating funding ideas like vehicle miles traveled fees, sales taxes for transportation, and other user fees can augment or ultimately replace the motor vehicle fuel tax.

- The continuing shift to an electric transportation system could significantly impact yields from WVDOT's primary revenue source.
- High inflation, recurring events impacting system assets, and other economic risks will reduce available resources for WVDOT to maintain, operate, and expand the system.

FINDINGS AND OPPORTUNITIES

A stable population, less fuel consumption due to new technologies, changing behavior patterns increasing on-demand trips and less personal driving, and/or more e-commerce dispersing freight movement are all contribute to WVDOT's declining revenues coupled with uncertain Federal funding, as costs escalate.

WVDOT developed a macroeconomic revenue forecasting model to further test and estimate future revenues against trends, scenarios, and potential outcomes explored as **Alternative Revenue Scenarios** and **Alternate Revenue Sources**. This transparent, user-friendly model is based on user-defined inputs, allowing it to assist long-range transportation planning and financial revenue forecasting from a macroeconomic base. Key model attributes include:

- Adjustable, forecasted revenue streams based on statistical relationships between economic, demographic, and technical factors.
- Models out alternative futures and other user-defined scenario impacts on transportation revenues.
- Separate modules incorporate user-based assumptions to forecast specific sources of transportation revenue.

This analysis assumed financial impacts on revenue from potential changes in sources starting from 2022. Highlights of the analysis are presented in Figure 23.

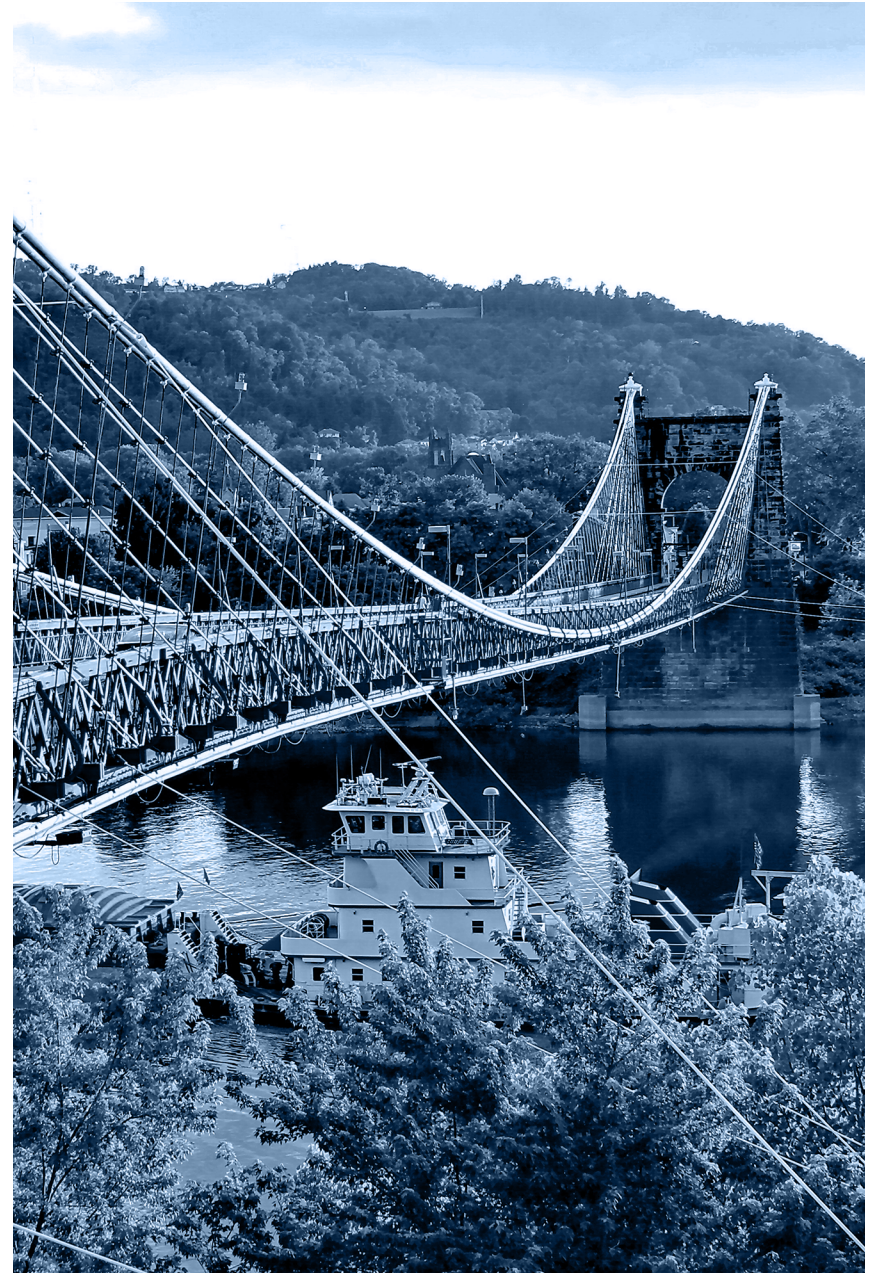
CHANGE FACTOR	REVENUE IMPACT (2022-2050)
1% increase in registration and license fees	\$0.11 billion
One-time 1% increase in Automobile Privilege Tax	\$1.66 billion
1-2% annual increase in motor fuel tax rates	\$1.94-\$4.30 billion
Aggressive adoption of electric vehicles by public	-\$0.26 billion
1/10th of 1 cent per mile VMT fee (to augment or ultimately replace fuel taxes)	\$0.58 billion*

* VMT fees are being evaluated and piloted by multiple States and the Federal Highway Administration as a future alternative or replacement to motor fuel taxes. The 2050 LRTP tested the impact of a 1/10th of 1 cent up to a 1 cent per mile VMT fee. Revenue potential for WV is as high as \$7 billion over the plan horizon.

FIGURE 23. REVENUE IMPACT HIGHLIGHTS

Overlaying political influences, public acceptance of changes, and costs, as well as level-of-effort will carry considerable weight in choosing future funding options. Many opportunities to address future revenue shortfalls exist but are complicated by local feasibility and actual implementation.

Adjusting State tax revenues and fees to mitigate demographic and/or market shifts requires public support on top of legislative approval. Encouraging private sector involvement through Public-Private-Partnerships (P3s) still comes at a cost from expensive contracts and lengthy concessions. Tolling can assist funding major corridors if travel demand is steady, but decreasing driver's licenses and driving may limit revenue from additional toll roads. While mileage-based user fees or other fees better link travel demand with transportation funding, roll out and oversight can complicate usage. Local and regional partnerships splitting the cost of multimodal investments using value capture, special taxes/fees, or local/regional ballot initiatives can benefit those communities involved if cooperation is successful.





VIEW OF HARPERS FERRY FROM MARYLAND HEIGHTS

5



UNDERSTANDING NEEDS AND REVENUE CHALLENGES ALONGSIDE OPPORTUNITIES

*What did we learn from the Needs Assessment and Financial Plan?
How does the gap inform how we develop strategies and actions?*

GAP ASSESSMENT: RESULTS AND IMPRESSIONS

The existing gap between needs and revenues is growing. Understanding needs alongside revenues positions WVDOT to prioritize investments relative to funding and keep the transportation system safe and reliable. However, transportation needs continue to exceed transportation revenues, forming a gap (Figure 24). The growing gap can be mitigated if alternative investment strategies efficiently use resources and consider new funding options to meet future needs. Identifying maintenance and improvement costs associated with multimodal transportation needs compared to available revenue is vital to meeting WVDOT's system efficiency, reliability, durability, and safety goals.

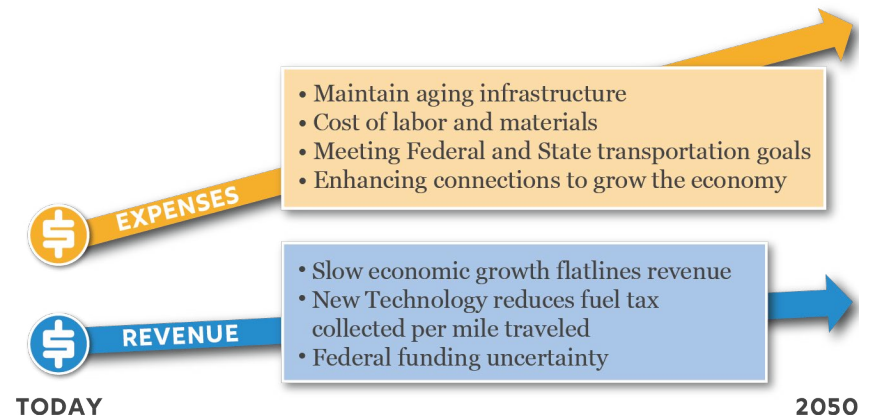


FIGURE 24. WHY EXPENSES EXCEED REVENUES

Within a long-range plan to 2050, needs will change alongside West Virginia's population and economy, and the yield of existing revenue sources will also change as the movement of people and goods shift. As a snapshot view from 2021 based on prior trends and understanding of future conditions, the [Gap Assessment](#) focuses on the gap between highway needs and revenues. It compares constrained needs to the baseline revenue forecast and provides the framework to develop 2050 LRTP investment portfolios and strategies.

Highway needs make up the largest share of short-term (2021 to 2030) and long-term (2031 to 2050) transportation needs (approximately 93 percent) given the State's large system plus importance to the State economy and lifestyles. Comparing needs to transportation revenues requires carefully assessing State-directed uses as West Virginia's traditional funding sources (motor fuel taxes, registration and license fees, privilege taxes, and user fees) are exclusively tied to highway-related improvements and purchase patterns, and most transportation needs and revenues continually fall towards highway improvements given the system extent and

overall travel preferences. Combining highway and non-highway needs to compare to total revenue completely illustrates the long-range planning analysis (Figure 25 and Figure 26). West Virginia may face a highway revenue shortfall (constrained gap) of **\$600M in 2021-2030** and **\$4,140M in 2031-2050** for highways based on constrained needs.

Multiple factors influence the gap size and growth rate. Failing to address the short-term gap will increase the long-term gap as infrastructure continues to deteriorate without repair, necessitating full replacement that consumes more financial resources. Increasing materials cost combined with inflation impacts purchasing power, which will increase the estimated short-term and long-term gap between transportation needs and revenues. Shortfalls are anticipated to average \$100 million per year over the next decade but grow to \$250 million per year between 2030 and 2050 compounded by greater long-term uncertainty. Even if baseline needs grow slower than anticipated, unanticipated recovery costs following extreme natural hazards combined with regular maintenance and operations will still cause needs to exceed revenues.

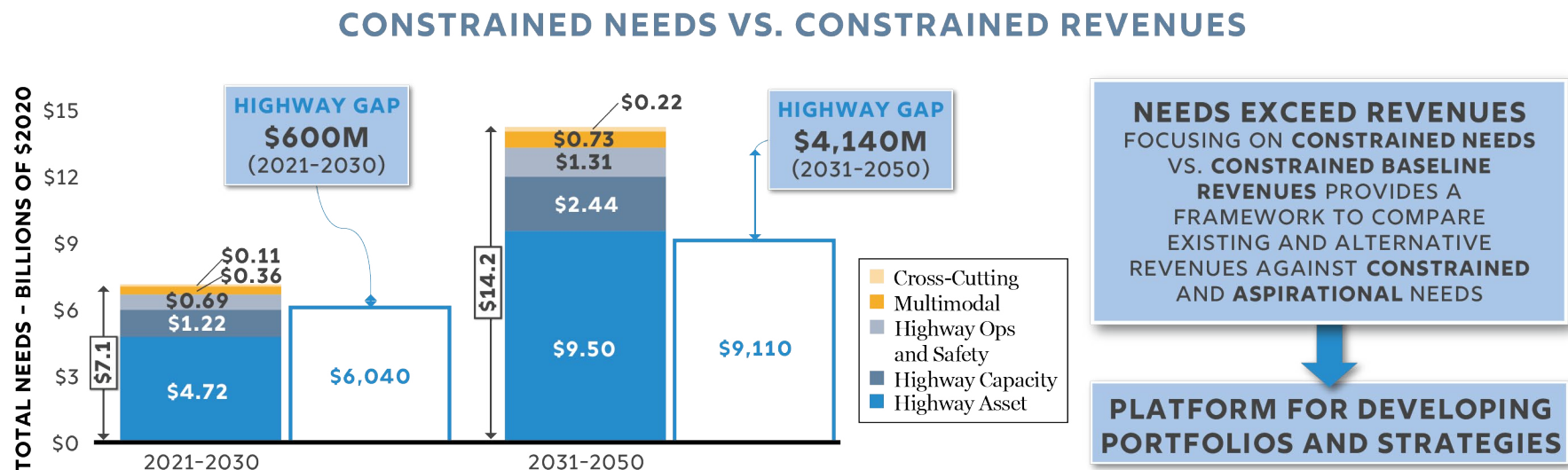
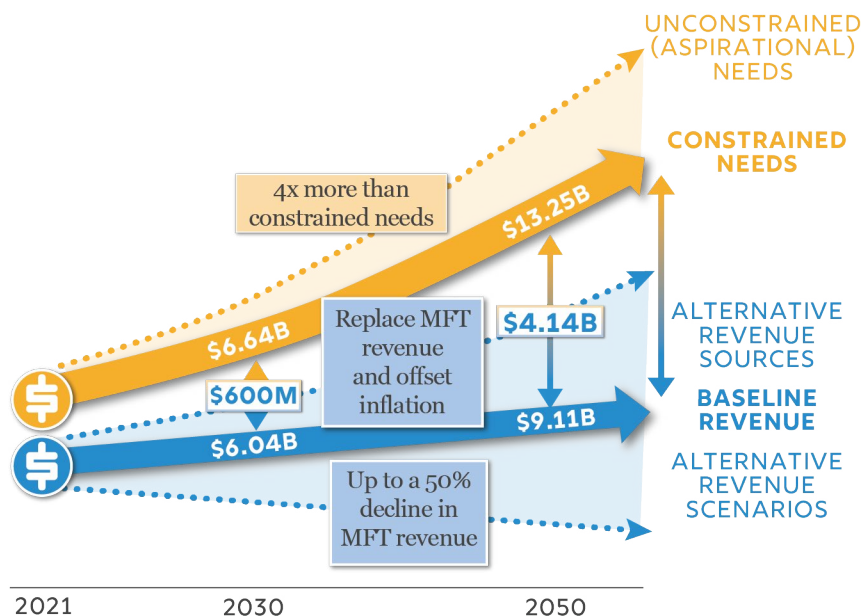


FIGURE 25. BASELINE FUNDING GAP



- The gap will continue to increase as needs and costs to do business increase
- The longer the revenue sources remain fixed, the more revenue risks increase from inflation and other external drivers
- More efficient spending and new revenue sources can reduce the gap

FIGURE 26. OVERVIEW OF NEEDS, REVENUES, AND ESTIMATED GAP THROUGH 2050

How people and goods move is changing, and closing the gap is complicated by many factors like those explored in Alternative Revenue Scenarios as part of the [Financial Plan](#). West Virginia recognizes the need to increase transportation revenues in a sustainable manner, and current discussions in Washington D.C. on the next surface transportation reauthorization are exploring new sustainable finance and user fee options to increase Federal revenue. Increasing value from existing sources, like the motor fuel tax indexed annually to inflation, combined with new options strengthens and diversifies the revenue base, but both take time, legislative action, and public referendums to implement.

APPROACH TO PORTFOLIOS AND STRATEGIES: HOW THE GAP GUIDES PORTFOLIOS AND STRATEGIES

Prioritizing investments to match future transportation needs to future revenues, given that needs exceed revenues now and increases in the future, the challenge opens up for opportunities to implement change (Figure 27). In addition to prioritizing, implementing cost-effective and sustainable transportation maintenance and capital investment projects and programs can help to manage current and future costs.

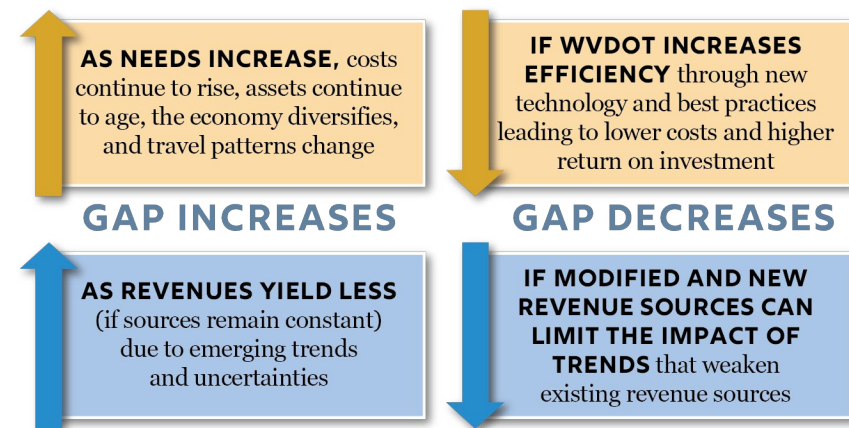


FIGURE 27. OPTIONS FOR REDIRECTING WVDOT'S FUTURE NEEDS AND REVENUES

However, another option, and the real focus of the 2050 LRTP, identifies investment portfolios, strategies, and actions that help WVDOT focus limited resources to the most pressing needs. Assessing constrained needs, constrained revenues, and the resulting gap provides the framework to compare existing and alternative revenues against constraints and aspirational needs, establishing the platform for developing investment portfolios and strategies within the 2050 LRTP.

Many uncertainties impact future transportation needs and revenues. Identifying both anticipated and unforeseen risks to revenue structures as the economy, transportation industry, and transportation technology change is necessary to keep assets maintained and people and goods moving safely. Changes in population, behavior, spending, business, industry, and travel all affect transportation, movement, and overall economic health. Upkeep of statewide systems to meet demand ensures safe and reliable mobility. Choosing future revenue structures that mitigate the impact from anticipated and unforeseen risks brings sustainable revenues.

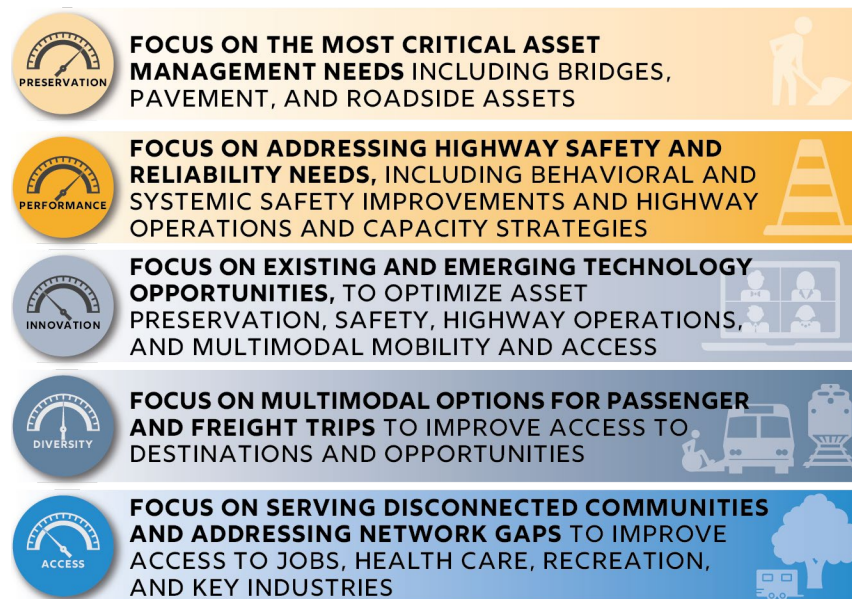


FIGURE 28. DEFINING PROPOSED INVESTMENT PORTFOLIOS

Identifying investment portfolios and trade-off analysis helps to focus limited revenues to the most pressing needs today and those that are evolving in the future. [Five Portfolios](#) help prioritize future investments (Figure 28). Within each portfolio, the 2050 LRTP details strategies and implementation actions within the next five years to help WVDOT meet goals and position to meet emerging issues.





SETTING PRIORITIES AND MAKING TRADE-OFF DECISIONS

*What strategies are most important now given our goals and the Gap Assessment results?
What are potential performance outcomes and what did we learn from engagement?*

DEFINING PORTFOLIOS AND ORGANIZING STRATEGIES

The five 2050 LRTP portfolios are operationalized by strategies and actions focused on proposed statewide system policies, programs, initiatives, or projects to address the current short and expected long-term gap ([Portfolio & Strategy Fact Sheets](#)). Strategies describe particular focus areas within each portfolio and have been screened through a qualitative assessment with input from specific experts and stakeholders. Actions stem from individual strategies to provide steps to engage agency experts, leverage resources and initiatives, initiate procedural changes, expand internal staff, or grow external partnerships to put strategies in motion.

Developing and tailoring strategies to enhance WVDOT asset, safety, mobility, operations, and multimodal performance through emerging technologies alongside State, local, or private partnerships drive the 2050 LRTP's outcomes and implementation. Focusing on short- and long-term actions with a subset of highest priority actions to implement within the next five years guides the efficient use of resources to achieve maximum impact.

The 2050 LRTP will help WVDOT communicate short- and long-term recommendations, increase agency accountability, guide policies into implementation, and execute goals and objectives through a practical, manageable approach. That approach will continue to involve WVDOT modal agencies, local planning partners, and other key stakeholders linking transportation decisions to achieve State goals.

STRATEGY ASSESSMENT: ALIGNMENT, PERFORMANCE, READINESS, AND RESILIENCE

Portfolio strategies were proposed through a multi-step process designed to address specific gap needs, reflect stakeholder priorities, support State and Federal requirements, and align with the 2050 LRTP's vision, goals, and objectives. Certain initial criteria and rationale proved foundational to strategy development and ultimately shaped the resulting actions to execute each strategy (Figure 29).

A total of 23 strategies surfaced from a detailed review with ample input from experts and key stakeholders. Some quantitative review measures were utilized to align with WVDOT bridge and pavement asset strategies tools, but more qualitative feedback tailored strategies to succinctly align with statewide priorities. The quantitative scenarios specified funding required to maintain Federal and State performance targets beyond the [2019 Transportation Asset Management Plan \(TAMP\)](#). Bridge and pavement asset strategies focus on enhanced data collection, systems integration, modeling, and technology enhancements, elevating asset management best practices to align with the development of other portfolio strategies (Section 8). Qualitative reviews can

help WVDOT assess more complex transportation outcomes tied to equity, economic development, public health, and accessibility in the future. The complete process to formulate strategies consisted of:

- **Qualitative Measures** – Four unique reviews determined how closely each strategy aligned with the 2050 LRTP's goals, its potential to improve transportation performance, its readiness to implement, and its resiliency to future trends like environmental and/or funding changes.
- **Agency Experts** – Interviews with specific expert's knowledgeable on pavement/bridge assets, non-highway modes (active transportation, transit, rail, and aviation), safety, traffic engineering/operations, performance management, and other areas (health services, tourism, economic development, and education) further refined and shaped strategy descriptions. Interviews also validated WVDOT divisions or units and/or external partners championing short-term strategy actions (Section 8).
- **Quantitative Measures** – Modeling performance-based pavement and bridge scenarios through WVDOT's asset management systems determined funding levels and potential strategies initially expected to communicate through WVDOT's trade-off tool.

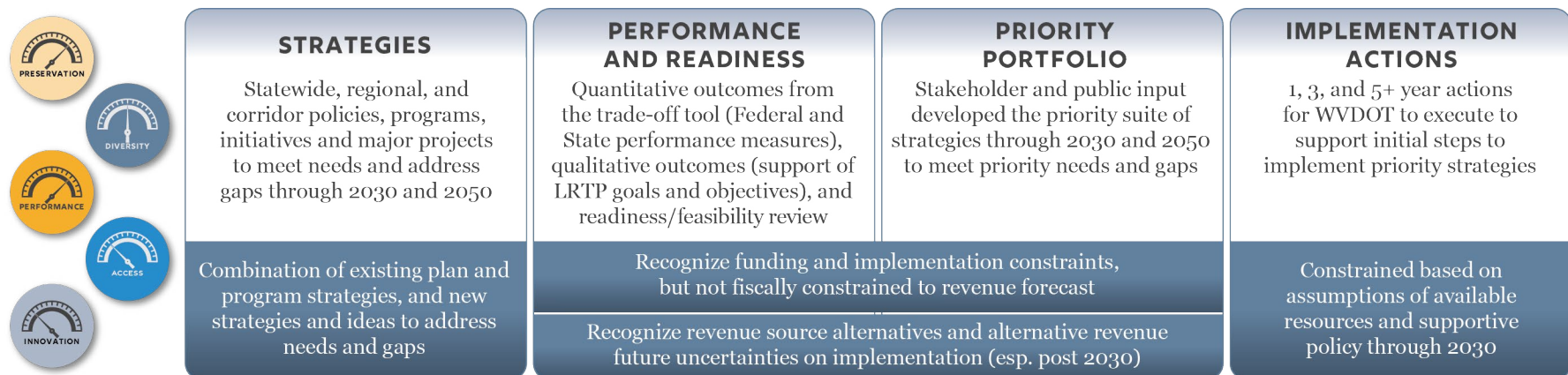


FIGURE 29. SHAPING STRATEGIES INTO ACTIONS

- **Stakeholder Engagement** – Input from four rounds of stakeholder meetings validated the strengths and importance of each strategy.
- **WVDOH Planning Division** – Professional review of strategies to ensure accurate description and correct strategy action leads with respective support groups.
- **Federal Requirements** – Confirming strategies align with WVDOT's FAST Act plans include the TAMP, Strategic Highway Safety Plan (SHSP), Public Transit Asset Safety Plan (PTASP) and Transportation System Management and Operations (TSMO)¹³ related activities.
- **Connection to West Virginia Goals** – Portfolio strategies and actions should help West Virginia meet existing and emerging state-wide goals. Examples like adequately maintaining rural routes connecting to regional and State parks and destinations ties with promoting statewide motorcycle and bicycle/pedestrian signing standards helping visitors and residents enjoy West Virginia's natural beauty. Implementing broadband across transportation projects, combined with programs providing equal access to healthy food choices and healthcare services targeted towards low income, elderly, and mobility impaired individuals in urban and rural areas, further connect the 2050 LRTP to West Virginia's overarching goals.

STRATEGY TIERING AND ANALYSIS

The screening produced 23 strategies to balance trade-offs (Figure 30) associated with the highest use of agency resources to achieve highest short- and long-term impact. The trade-off analysis uses multiple information sources to help make strategy decisions, including:

- Building from needs assessment and revenue forecast.
- Focusing on program level considerations consistent with current programs.
- Organizing outcomes to inform policy and program level direction.

¹³ Transportation Asset Management Plan (TAMP), Strategic Highway Safety Plan (SHSP), Transit TAM (Transit Asset Management Plan), Public Transportation Agency Safety Plan (PTASP), and activities related to Transportation System Management and Operations (TSMO).

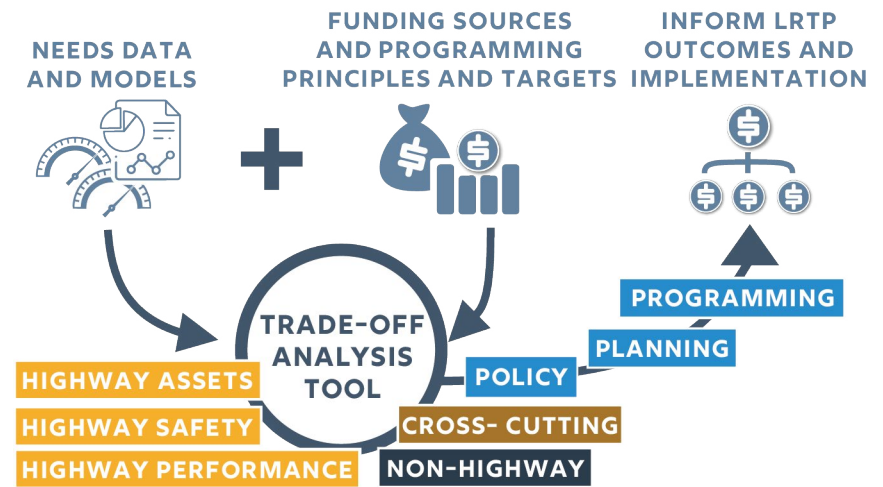


FIGURE 30. PORTFOLIO STRATEGIES

PERFORMANCE OUTCOMES

In setting transportation goals, WVDOT will monitor the transportation system's performance to determine if implemented programs and projects are achieving their stated goals. Performance-based decision-making relies on intense ongoing data collection, analysis, reporting, and monitoring processes, which requires WVDOT to calculate several specific system performance measures on a routine basis as required by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA).

The **Federal Performance Measures** guide multimodal transportation management, link to national transportation goals, and align with the 2050 LRTP goals and objectives. Highway safety covers all public roads. Highway infrastructure and reliability/freight mobility focuses on National Highway System (NHS) roads in West Virginia, totaling 1,986 roadway miles and 1,294 bridges. Transit asset management and safety applies to public transportation providers like those in West Virginia receiving Federal funds.

ORGANIZED INTO FIVE AREAS:



FIGURE 31. FEDERAL PERFORMANCE MEASURES

Since 2017, WVDOT has used performance targets for each Federal measure, coordinating with MPOs and transit providers. Targets build on and incorporate the goals and objectives of other statewide transportation plans and processes including the Highway Safety Improvement Program (HSIP), SHSP, TAMP for the NHS, State Freight Plan, West Virginia's Transit Asset Management (TAM) Plan, and the Public Transportation Agency Safety Plan (PTASP).

In response to Federal regulation, the 2050 LRTP includes a System Performance Report describing *Federal Performance Measures and targets as well as how WVDOT uses Federal Performance Measures* to evaluate the entire transportation system and show progress towards achieving targets. The System Performance Report presents baseline and current performance, performance targets for 16 performance measures, and documents underlying data with latest trends driving WVDOT's performance-based approach to transportation planning and decision making. Through the ongoing performance monitoring and reporting process, WVDOT uses results to set priorities and balance trade-offs between performance areas.

Figure 32 presents a summary of transportation system performance trends and targets for the FHWA measures. In 2019, West Virginia made significant progress (based on comparison of the established 2019 target to actual performance) for 9 out of 13 applicable measures.

SAFETY PERFORMANCE MEASURE	2017	2018	2019	2019 TARGET	2020 TARGET	2021 TARGET
Number of fatalities	304	294	260	283	267	264
Fatality rate (per 100 million vehicle miles traveled)	1.59	1.51	1.36	1.498	1.482	1.457
Number of serious injuries	1,063	1,007	906	977	1,120	1,002
Serious injury rate (per 100 million vehicle miles traveled)	5.57	5.18	4.75	5.37	5.360	5.023
Non-motorized fatalities and serious injuries	86	103	93	89	77	86

PAVEMENT, BRIDGE, SYSTEM PERFORMANCE, FREIGHT, AND AIR QUALITY PERFORMANCE MEASURES	2017	2018	2019	2019 TARGET	2021 TARGET
Percent of Interstate System Pavements in Good Condition	73.4%	78.7%	80.6%	-	75.0%
Percent of Interstate System Pavements in Poor Condition	0.1%	0.2%	0.0%	-	4.0%
Percent of Non-Interstate NHS Pavements in Good Condition	40.9%	42.6%	43.0%	40.0%	45.0%
Percent of Non-Interstate NHS Pavements in Poor Condition	1.2%	1.2%	2.0%	5.0%	5.0%
Percentage of NHS Bridges in Good Condition	13.9%	13.1%	11.6%	14.0%	11.0%
Percentage of NHS Bridges in Poor Condition	11.9%	15.3%	13.5%	10.0%	13.0%
Percent of the Person-Miles Traveled on the Interstate That Are Reliable	99.8%	99.0%	99.1%	98.0%	96.0%
Percent of the Person-Miles Traveled on the Non-Interstate NHS That Are Reliable	91.9%	94.6%	93.7%	-	87.0%
Truck Travel Time Reliability (TTTR) Index	1.21	1.27	1.28	1.25	1.40
Total Emission Reductions: PM _{2.5}	0.092	-	0.122	0.092	0.092
Total Emission Reductions: PM ₁₀	0.000	-	0.133	0.000	0.000

FIGURE 32. SYSTEM PERFORMANCE TRENDS AND TARGETS



STAKEHOLDER AND PUBLIC INPUT

*How did we engage the public amidst a global pandemic?
What strategies did we use to reach all West Virginians?*

ENGAGEMENT STRATEGY

Stakeholder and public engagement are fundamental to long-range transportation planning because each want and need must be understood to effectively plan for all future multimodal transportation users. WVDOT developed a comprehensive Stakeholder and Public Engagement Plan before the COVID-19 pandemic with in-person and virtual outreach and engagement opportunities to reach every resident, from those in rural areas, underserved communities, and in urban cores. Due to the pandemic, all stakeholder and public engagement became completely virtual to follow health officials' recommendations, WVDOT's policies, and the Governor's "Safer at Home" order. To promote a safe and effective engagement process, engagement phases with supporting documents were posted on the 2050 LRTP Website, WVDOT's social media accounts, across email blasts to regional and community-based organizations, and during stakeholder meetings to capture and retain public input (Figure 33).

SOCIAL MEDIA AND PROJECT WEBSITE

A *Social Media Toolkit* was developed due to the COVID-19 pandemic to encourage virtual engagement and assist WVDOT, MPOs, RPDCs, and stakeholders to inform citizens of plan development. Providing 12 weeks of project-related content, social media posts, and corresponding graphics for social media accounts helped create a forum to discuss project updates, the detailed schedule, and better engage overall with the public.

WVDOT developed and hosted the 2050 LRTP website (<https://transportation.wv.gov/highways/programplanning/LRTP/Pages/default.aspx>) to explain the 2050 LRTP planning process and serve as a clearinghouse for multimodal transportation planning by providing plan and project information, content fact sheets, contact information, and additional

What is the West Virginia Long Range Transportation Plan (WVLRTP)?



2020

2021

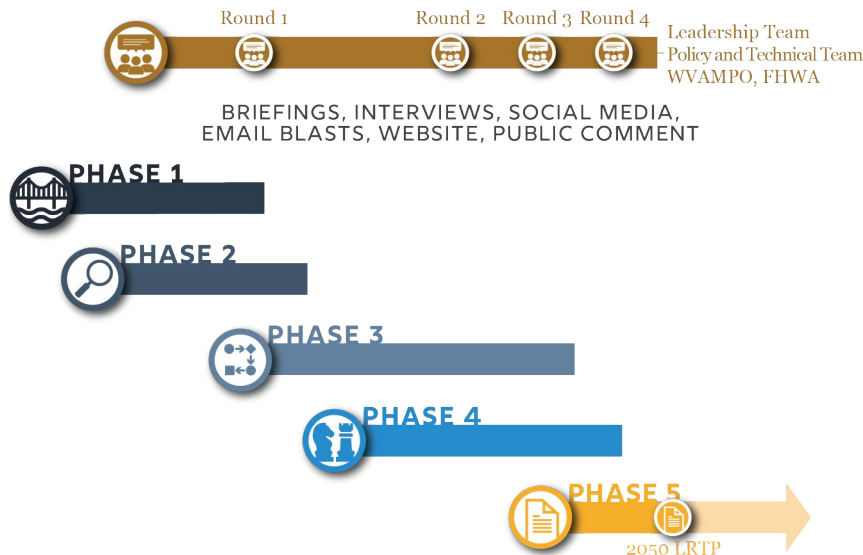


FIGURE 33. 2050 LRTP TIMELINE

resources across the five study phases as well as stakeholder and public engagement. The [2050 LRTP website](#) hosts the final 2050 LRTP and supporting documents.

STAKEHOLDERS APPROACH AND INSIGHTS

Engagement Round 1

Engagement Round 1 focused on working with key policy and technical stakeholders as well as WVDOT leadership to gather insight on the LRTP's vision, goals, and objectives as well as move forward with Phase 1 (State of the System) and Phase 2 (Trends, Drivers, and Opportunities) of the LRTP. The Policy and Technical Team of subject matter experts across WVDOT, urban and rural regional planning organizations, Federal partners, and other related State agencies provided specific direction, insight, data, and best practices to help WVDOT create a comprehensive and implementable LRTP. The Leadership Team of each WVDOT division reviewed key plan findings and provided overall direction to ensure the LRTP supports WVDOT's mission and create a platform to support West Virginia's economy and quality of life.

Round 1 had virtual meetings with the Leadership and Policy and Technical Teams on September 24, 2020, and October 15, 2020. At the September meeting, team roles, the plan approach and schedule, accomplishments completed to date, as well as next steps were discussed in preparation for further work. The October meeting focused on the purpose of the plan and the preliminary engagement process; vision, goals, and objectives; trends and opportunities; and next steps. Attendees were individually polled to shape the Goals and Objectives and asked to rank each based on level of importance according to individual organizational roles.

Based on the October poll results, "System Condition, Efficiency, & Fiscal Sustainability" ranked 1st; "Safety and Security for All Users" ranked 2nd; "Economic Vitality & Freight Movement" ranked 3rd; "Multimodal Mobility, Reliability & Accountability" ranked 4th; and "Livable & Healthy

Communities” ranked 5th. Attendees were also asked to rank each draft goal based on level of importance as West Virginia citizens which yielded the same top two results but moved “Multimodal Mobility, Reliability & Accountability” 3rd; “Livable & Healthy Communities” 4th; and “Economic Vitality & Freight Movement” 5th.

COORDINATION WITH STAKEHOLDERS AND INTERESTED PARTIES

Engagement Round 2

Engagement Round 2 continued focusing on working with key policy and technical stakeholders as well as WVDOT leadership to gather more insight on the 2050 LRTP’s vision, goals, and objectives. Round 2 also advanced Phase 3 (Future Needs, Revenues, Priorities) and Phase 4 (Policies, Strategies, Trade-offs) of the LRTP. Round 2 had more virtual meetings with the Leadership and Policy and Technical Teams from February 3-4, 2021 where plan schedule and status, Phase 3 ([Needs Assessment](#)), Phase 4 (Needs Prioritization, Strategies, Policies, Revenue Forecast, [Gap Assessment](#)), and next steps were discussed to continue to develop the 2050 LRTP.

Engagement Round 3 and Round 4

Engagement Round 3 included additional virtual meetings with the Leadership and Policy and Technical Teams and key WVDOT experts from April 20-21, 2021, where findings from Phase 3 and Phase 4 as well as next steps were discussed to further shape the 2050 LRTP. Several follow up virtual meetings were held in May and June 2021, with specific experts for each portfolio, including Highway Preservation, Highway Programs, Innovation, Access, and Diversify. Strategies as well as short and long-term actions pertaining to each portfolio were discussed with the experts to validate and/or restructure priorities through an in-depth Q&A. Feedback was then used to finalize key actions and [Portfolio Fact Sheets](#). On June 7-8, 2021 Round 4 meetings reviewed draft final

strategies and actions with each Team and discussed how the 2050 LRTP would document implementation actions for WVDOT. The results of these meetings shaped the information presented in Section 9 of this Plan.

VIRTUAL PUBLIC MEETINGS

WVDOT hosted two Virtual Open-House Public Meetings during Engagement Round 3 to give the public the opportunity to review project findings, ask questions, provide comments, and informally discuss the 2050 LRTP with WVDOT. WVDOT advertised the meetings on [its website](#) and social media accounts to inform residents and business owners and published a press release for local, regional, and statewide media outlets like newspapers, news stations, and radio stations to further broadcast meeting information.

Meetings were held on June 15, 2021, via GoToWebinar and call-in from 1:00 p.m. to 2:00 p.m. and again from 6:30 p.m. to 7:30 p.m. Each meeting included a presentation discussing project findings and a Q&A to allow participants to ask questions and provide comments. The [2050 LRTP website](#) includes a comprehensive overview of information on the 2050 LRTP discussed during the public meetings.

The public comment period for the 2050 LRTP was advertised via legal notice in area newspapers, on the WVDOT website, and via email to the LRTP’s distribution list. Comments were submitted at the Virtual Public Meetings, by mail, or email via DOT2050@wv.gov. Additional details were made available on WVDOT’s the [2050 LRTP website](#).

Throughout the LRTP development process, materials have been posted to the LRTP website on a regular basis to share draft documents and meeting presentations for stakeholder and public review. When materials were posted, stakeholders were notified via email, including a list of over 200 WVDOT contacts representing local organizations and citizen groups.



NEAR BLACKWATER FALLS STATE PARK AND SENCA ROCKS



8

CONNECTIONS

How does the LRTP guide strategic plans, near term programs, and investment priorities?

Transportation planning is a continuous process. As shown in Figure 34, development of the 2050 LRTP links WVDOT's long term goals and objectives to short-range strategic plans that guide development and implementation of each WVDOT Division's **capital program**. Delivery of the capital program and day-to-day operational and maintenance decisions support ongoing **performance management** that uses performance data to inform decision making. Ultimately there is a feedback loop as performance of the system evolves and new priorities emerge, this drives new long-range and strategic planning to address issues.

Each update to the LRTP is an opportunity to review plan vision, goals, and objectives to meet changing transportation trends and conditions and adjust WVDOT's short term priorities. The 2050 LRTP outcomes can be incorporated into future updates to the SHSP, TAMP and Freight Plan and future mode specific and MPO MTPs. This process will help align, strengthen, and coordinate decisions across the department and with external partners. **The completion of the 2050 LRTP sets the transportation “lifecycle” in motion to facilitate policies, practices, and data driven decisions leveraging agency efficiency and optimizing scarce resources.**

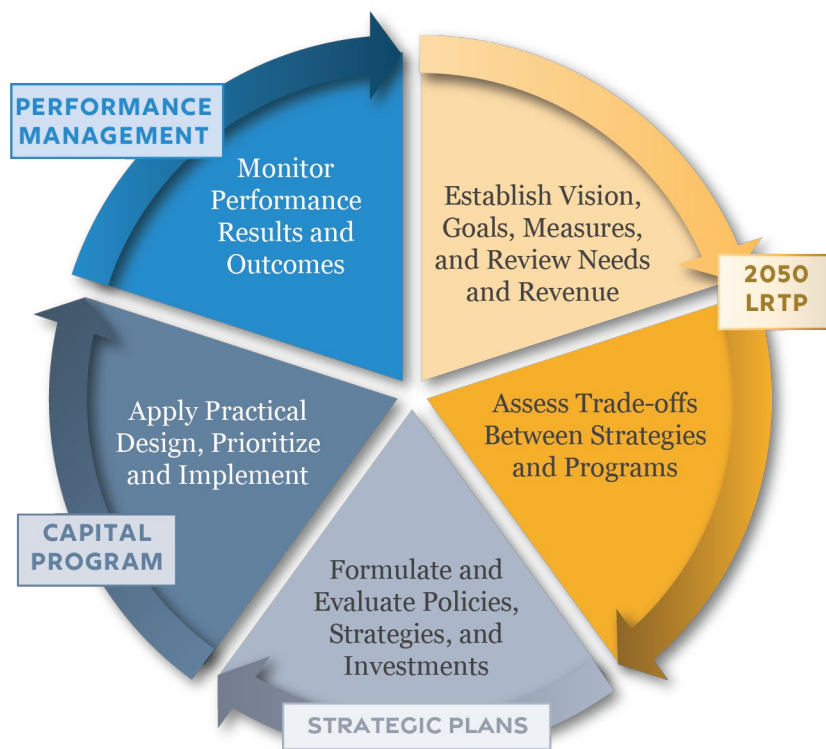


FIGURE 34. TRANSPORTATION PLANNING LIFECYCLE

STRATEGIC

How do the 2050 LRTP goals and objectives link to system and modal plans?

The 2050 LRTP's goals and objectives focus on activities to promote transportation performance but also highlight how transportation decisions link to broader statewide goals and emerging issues. The link between the 2050 LRTP to short term plans and capital programs can occur at different scales (network, corridor, or by mode) and defined

using quantitative or qualitative measures. Quantitative measures can assess how long-term strategies influence safety, asset condition, and system reliability outcomes. Qualitative measures can compare the 2050 LRTP's statewide focus against more modal or system specific emerging needs, challenges, and tactical opportunities. Qualitative measures can also report complex outcomes, like equity, economic development, public health, and accessibility. Collectively a mix of tools and assessment approaches can support these planning connections.

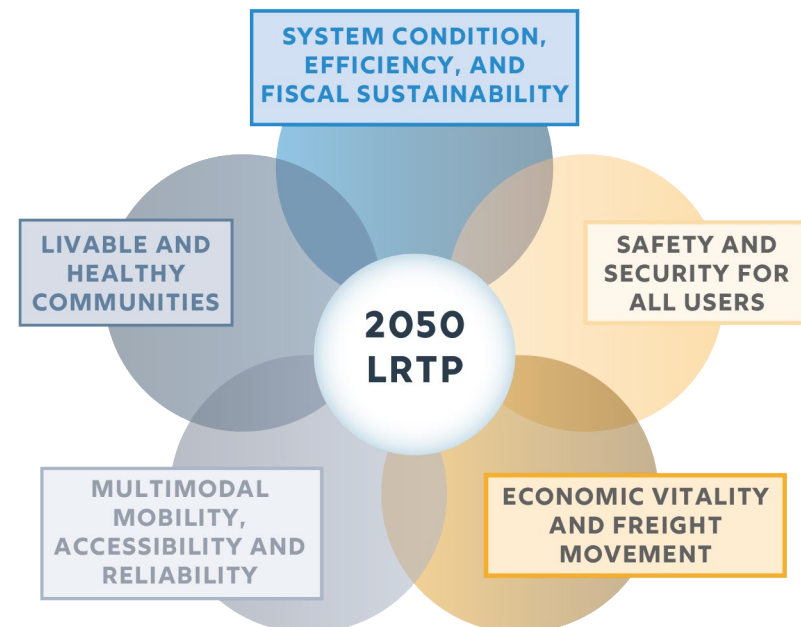


FIGURE 35. 2050 LRTP GOAL SUMMARY

As shown in Figure 35, the LRTP can inform the next cycle of statewide, strategic, modal, and regional long-range plans, including ongoing updates of West Virginia's eight MPO's Metropolitan Transportation Plans (MTP). Federal regulations require these plans to be updated every five years. These plans directly guide updated capital programs, including the Statewide Transportation Improvement Program (STIP), which outlines projects funded through Federal and State sources over the next six-years.

Ultimately, delivery of the STIP and other associated capital and operating programs, requires data, decision support systems, standard operating procedures, and communications with stakeholders and the public to ensure transparent, accountable decisions by WVDOT.

SYSTEM AND MODAL PLANS

guide strategic, coordinated investments to reduce costs and increase efficiency in response to emerging needs

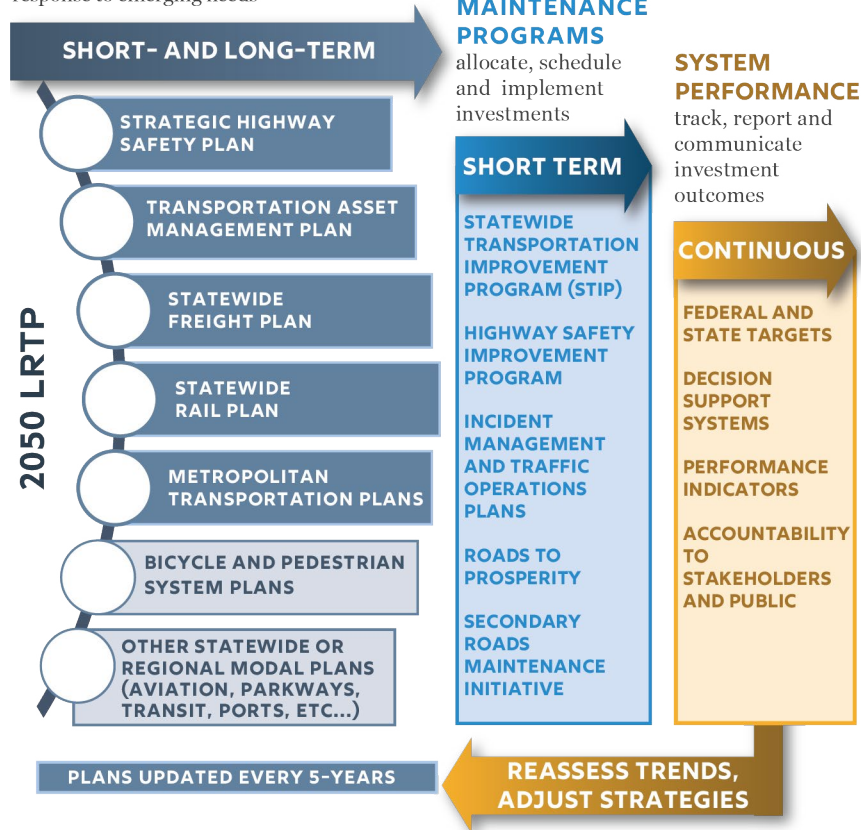


FIGURE 36. LRTP CONNECTIONS TO PLANS AND PROGRAMS

POLICY

How does the 2050 LRTP interact with strategic planning efforts like the TAMP, SHSP, and Freight Plan that directly inform capital investments?

How are short- and long-term funding levels balanced across highway system priorities including asset management, safety, and reliability?

What funding levels are required to maintain or enhance system performance?

Strategic connections lead to critical questions and trade-offs between competing system priorities. WVDOT seeks to provide a balanced approach for meeting its system responsibility, while also serving the interest of emerging trends and broader statewide needs. Trade-off decisions are also constrained by funding eligibility and programming requirements.

Future strategic plan updates and continuous performance management will allow WVDOT to measure, adapt, and adjust its approach. This is a part of ongoing updates to the TAMP and future updates to the SHSP and Freight Plan. For example, WVDOT's bridge and pavement management tools, which support forecasts of future bridge and pavement needs, and the trade-off analysis tool developed as part of the LRTP process, collectively provide a platform to test and compare varying investment scenarios resulting in estimates of bridge and pavement system performance outcomes. These tools address trade-offs within program areas; for example, among and between different bridge and pavement systems. Investment decisions within other highway programs, like safety, follow Federal guidance and follow WVDOT plans, like the Highway Safety Improvement Program and the SHSP.

While valuable to inform decision making regarding maintaining WVDOT bridge and pavement assets, these tools and associated plans do not consider trade-offs among different highway programs (for example between

bridge programs and safety programs) or between highway programs and other modal programs. Both MAP-21 and the FAST Act have increased flexibility in the use of Federal funding across these different highway programs, and in some cases even between highway and transit programs.

Currently, the funding approach to transportation in West Virginia keeps each mode siloed—State revenue sources like the motor vehicle fuels tax and registration fees are only used to fund WVDOH activities. WVDOH activities support other modes like bicycle and pedestrian networks and facilitate improved access to economic development sites and intermodal terminals funded through Aeronautics, Parkways, Rail, and Transit.

Approximately 70 percent of WVDOH roadway mileage is not eligible for Federal aid. This creates a significant challenge to managing the safe operation of these facilities as they are effectively only funded through State revenue sources (in other words they cannot use the approximately 32 percent of total DOH revenue received from the Federal government). MAP-21 and the FAST Act do provide limited opportunity to shift surface transportation block grant (STBG) funding to maintain non-Federal aid eligible bridges. However, this amount totals only about \$12 million annually. Roads to Prosperity created a great opportunity to invest in these roadway miles while also enabling the platform for the Secondary Roads Maintenance Initiative which has helped proactively address pavement and bridge condition needs on these roads. However, once Roads to Prosperity funds are spent, many of these opportunities for supporting non-Federal aid eligible facilities disappears, and the gap between needs and funding will increase again.

BRIDGE AND PAVEMENT INVESTMENT AND PERFORMANCE TRADE-OFF SCENARIOS

The 2050 LRTP utilized information from the TAMP, bridge and pavement management systems, and the trade-off analysis tool to test different investment and performance driven scenarios. This analysis presents the implications of different program level funding decisions on long-term system performance. Three scenarios in Figure 37 were tested in comparison to a revenue constrained scenario and performance-driven scenario.

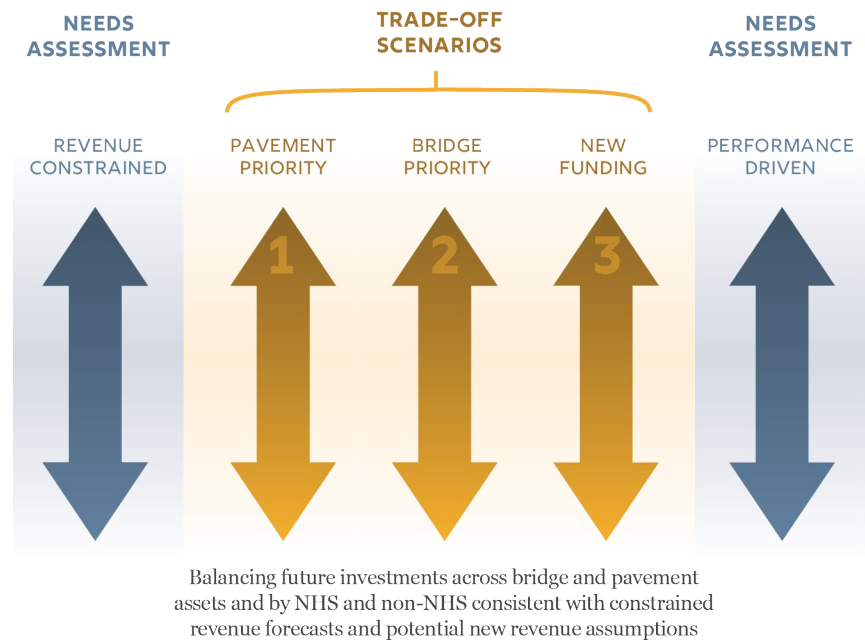


FIGURE 37. TRADE-OFF SCENARIOS

- **Revenue Constrained** – WVDOH continues to invest in bridge and pavement asset management consistent with the 2019 TAMP and reflected in the STIP. This scenario is identical to the constrained needs forecast presented in the [Multimodal Needs Assessment technical report](#).
- **Performance-Driven** – The bridge and pavement management systems estimated costs to maintain bridge and pavement conditions consistent with FHWA-established performance targets. This is most critical for bridges, as projected percent poor is at or above 30 percent in 2030 and beyond, while the FHWA target is 10 percent poor. This approach ramps up investment gradually over a 10-year period between 2024 and 2034 to reach target performance in 2035 and beyond. While this reflects a model-driven outcome, real implementation is constrained by resource availability accounting for the timing necessary to

design, permit, and implement bridge and pavement capital improvements. Note, this scenario requires approximately a doubling of funding for WVDOH bridge and pavement assets through 2050 (roughly an additional \$13 billion, or around \$460 million more per year). None of the individual revenue source alternatives assessed within the Financial Plan satisfy this revenue need, although a combination of multiple sources (both from transportation and non-transportation sources) could achieve this level of need post 2030.

The three scenarios focus on unique questions regarding future WVDOH bridge and pavement investments.

- **Scenario 1 – Prioritize Pavement Condition:** WVDOH owns and maintains approximately 33,000 miles of non-NHS roadways. 74 percent of non-NHS roadways are also not eligible for Federal aid. There is uncertainty regarding the condition of these assets given the extent of the system and substantial resources needed to comprehensively track condition. Programs like the Secondary Roads Maintenance Initiative recently have focused new financial resources to address critical needs on this system. This scenario asks the following trade-off question: **If WVDOH increases investments on non-NHS pavement, what level of investment is needed to maintain current performance and what is the performance implication to NHS pavement (assuming resources are transferred from that system)?** Note, any trade-off between NHS spending and non-NHS spending would need to account for what roads are eligible for Federal aid (in other words, Federal funds shifted to non-NHS could only be used on the remaining 26 percent of roads that are Federal aid eligible, while the rest has to be State funding).
- **Scenario 2 – Prioritize Bridge Condition:** WVDOT leadership directed a \$50 million annual program increase to the baseline NHS bridge program starting in 2024, as a result of findings and new programmatic direction developed through the TAMP. This is primarily a reaction to the fact that most NHS bridges are nearing the end of their

expected design life resulting in a “wave” of considerable investment need in the next 10-15 years. In the resource constrained scenario, the percent poor deck area for NHS bridges increases from 12 percent in 2020 to 37 percent by 2030. This scenario asks the following trade-off question: **If WVDOH further increases investments on both NHS and non-NHS bridges, without assuming additional revenue, what extent of resources can be shifted from other capital programs, primarily the regional mobility program and other expansion programs, to improve bridge performance while not seriously constraining performance of other systems?** Note, these shifts assume that funding is held intact through 2026 consistent with the current STIP and all current project commitments are met.

- **Scenario 3 – New Funding to Bridge and Pavement:** In the [2050 LRTP Financial Plan](#), alternative revenue sources were modeled relative to the baseline revenue forecast for WVDOH. One particular alternative revenue source of interest, similar to recent actions by two neighboring states (Maryland and Virginia) is to annually increase the motor vehicle fuels tax rate consistent with inflation. This level of annual increase to motor vehicle fuel taxes (estimated at 2 percent annual), could increase total WVDOH revenue by an average of \$44 million per year through 2030 and by \$193 million per year from 2031 to 2050. This scenario asks the following trade-off question: **If this additional amount of funding becomes available resulting from changes in revenue sources, how should WVDOH optimize investments to maximize the performance outcomes across its bridge and pavement systems?**

The results are presented in the figures on the next pages including the average annual funding and the performance implication in 2032 and 2042 of each scenario. The focus is on two points in time—the next 10 years (what can be accomplished by 2032) and the next 20 years (what can be accomplished by 2042).

BASELINE

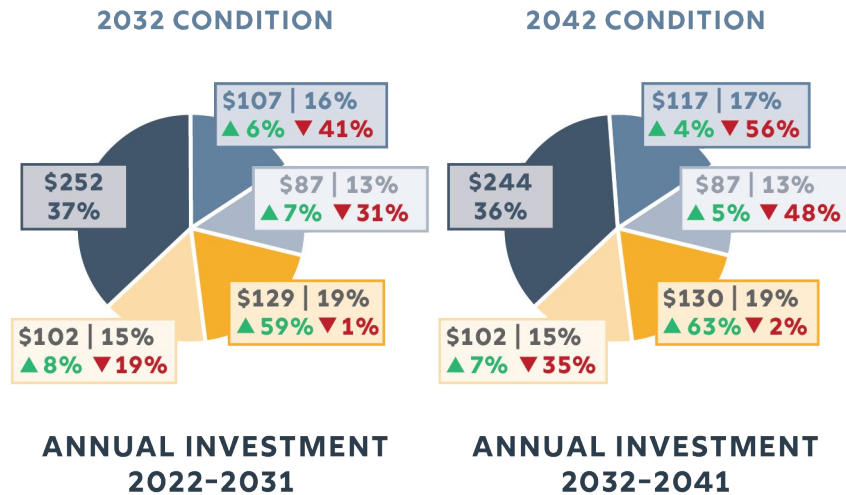


FIGURE 38. BASELINE SCENARIO

■ NHS Bridge ■ Non-NHS Bridge ■ NHS Pavement ■ Non-NHS Pavement ■ Other Capital Investment

▲ % Good Deck Area (bridge) ▼ % Poor Deck Area (bridge)
▲ % Good Lane Miles (pavement) ▼ % Poor Lane Miles (pavement)

The **BASELINE SCENARIO** maintains funding levels and distributions through 2041 consistent with the TAMP and the STIP. The performance results are based on bridge and pavement management system outputs and assumptions regarding condition and replacement cycles for non-NHS pavement. While NHS pavement condition remains at a high standard of performance, NHS and non-NHS bridges and non-NHS pavement condition continues to decline. This is particularly the case for bridges, which move from 11 percent poor for NHS and 15 percent poor for non-NHS in 2020, to 41 percent poor for NHS and 31 percent poor for non-NHS by 2032.

SCENARIO 1

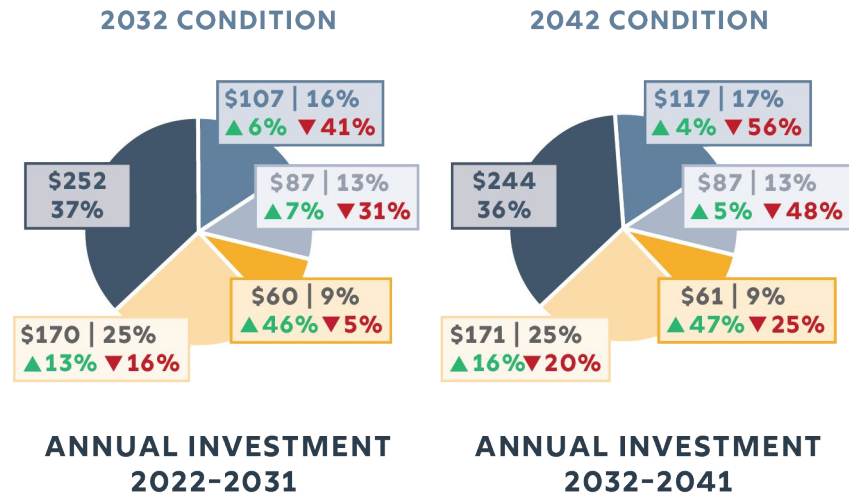


FIGURE 39. PAVEMENT PRIORITY SCENARIO

SCENARIO 1 cuts the NHS pavement program by around 50 percent and redistributes that funding to non-NHS pavement program. In practice, this redistribution is limited by the extent of non-Federal aid-eligible facilities (74 percent of non-NHS road miles). Through 2032, NHS pavement increases from 1 percent to 5 percent poor, however through 2042 the increase is more substantial, from 2 percent to 25 percent poor. The resulting benefit to non-NHS pavement shows a decline from 35 percent to 20 percent poor by 2042. The value of this scenario is marginalized due to the lack of comprehensive non-NHS pavement condition data. This scenario does provide perspective on how moving funding from NHS pavement could impact long-term performance.

SCENARIO 2

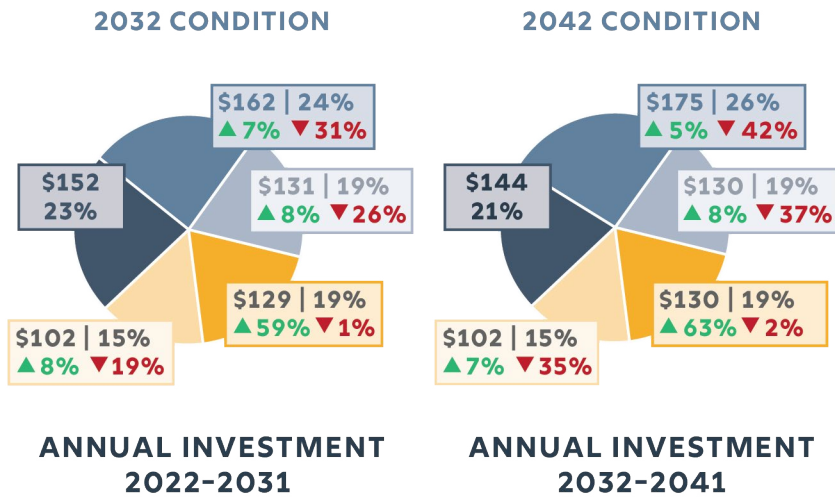


FIGURE 40. BRIDGE PRIORITY SCENARIO

■ NHS Bridge ■ Non-NHS Bridge ■ NHS Pavement ■ Non-NHS Pavement ■ Other Capital Investment

▲ % Good Deck Area (bridge) ▼ % Poor Deck Area (bridge)
▲ % Good Lane Miles (pavement) ▼ % Poor Lane Miles (pavement)

SCENARIO 2 decreases funding for other capital initiatives, primarily from the regional mobility program, by 40 percent, providing an additional \$100 million annually to the bridge program. The resulting benefit to bridge performance shows a significant decrease in percent poor – for example, from 41 percent to 31 percent poor in 2032 and from 56 percent to 42 percent poor in 2042 for NHS bridges. The result of this scenario exchanges 25 percent fewer poor bridges for less investment in highway expansion programs. The performance impact of less expansion spending is uncertain at the statewide level. On individual corridors it could be mitigated through short-term investment in lower cost traffic management strategies, rather than high-cost new capacity.

SCENARIO 3

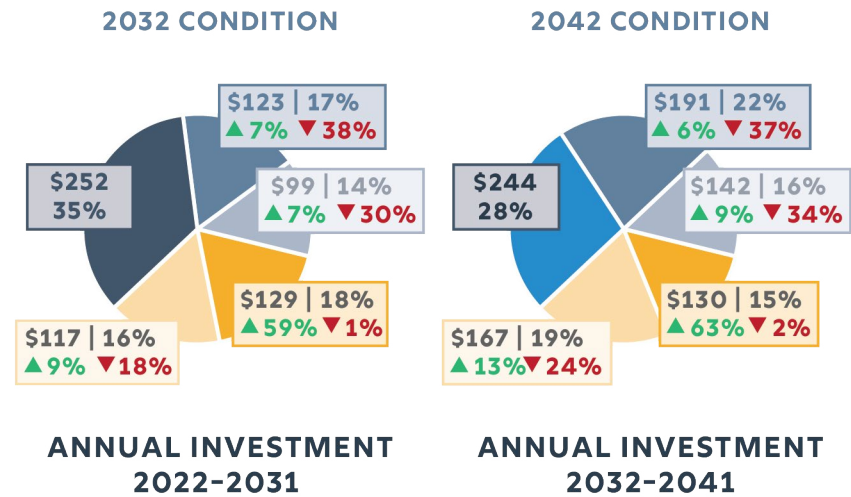


FIGURE 41. NEW FUNDING SCENARIO

SCENARIO 3 considers the benefits of a proportional increase in funding to the bridge program and non-NHS pavement (with NHS pavement retaining the revenue constrained forecast) consistent with potential new revenue from State motor vehicle fuel taxes being annually indexed to inflation. In this scenario each system performs the same or better than the baseline, as a result of an average additional \$44 million annually through 2032 and an additional \$193 million annually through 2042. Performance impacts are minor through 2032, however, through 2042, NHS bridges decrease from 56 percent poor to 37 percent poor and non-NHS bridges decrease from 48 percent poor to 34 percent poor.

INTERPRETING THE SCENARIO RESULTS

The LRTP Gap Assessment shows that combining additional revenue and more efficient spending are the primary drivers to fix the revenue compared to needs gap. No single change addresses current as well as projected bridge conditions alongside meeting regular WVDOT responsibilities **like maintaining pavement and other roadway assets to provide a safe and efficient highway system.**

- The strategies and actions presented in LRTP Section 9 identifies steps over the next five years capturing opportunities to reduce costs while addressing evolving needs. Long term strategies and actions to 2030 and beyond provide additional partnership and resource sharing opportunities to close the gap.
- LRTP Section 5 considers new and sustainable revenue sources to give WVDOT long-term confidence in State revenue. Thoroughly addressing bridge and pavement condition over the coming decades will require sustained additional revenue for transportation from State and Federal sources.
- WVDOT manages many spending priorities and responsibilities, but two fundamental gaps persist in WVDOT asset performance – non-NHS pavement and both NHS and non-NHS bridges. The trade-off analysis in this section presents high-level outcomes across opportunities and risks to address these gaps.

Non-NHS Pavement

- **WVDOT could shift program funding from NHS pavement maintenance and preservation to bolster non-NHS pavement and bridges.** Reducing some investment is possible while still maintaining the current condition of 0.0 percent poor Interstate pavement and 1.2 percent poor non-Interstate NHS pavement in 2020, both below FHWA's 5 percent poor threshold. However, limitations exist because 70 percent of total WVDOT roadway miles are not eligible for Federal aid. This restricts where WVDOT can leverage State funds with Federal sources.

- **WVDOT could move funds from discretionary mobility enhancing projects (road widenings and interchange or intersection improvements) and other capital spending to boost funding for non-NHS pavement.** However, limitations also exist on these transfers based on non-Federal aid eligible facilities alongside present commitments to priority and corridor development projects within the STIP.
- **Real performance outcomes from additional funding to support non-NHS pavement condition overtime is uncertain given absence of comprehensive condition data.** The [WVDOT Projects Map](#) shares information with the public on road investments as part of the Secondary Roads Maintenance Initiative as well as ditching, patching, and stabilization efforts as part of core maintenance activities. Addressing years of deferred non-NHS pavement needs improves local access and safety critical to rural and remote communities across the State. More informed decisions can be made as condition data becomes more comprehensive within limited resources to address immediate and term pavement needs. **Ultimately more funding or program extensions are needed as bond funds from the Roads to Prosperity Program and funding for the Secondary Roads Maintenance Initiative declines while WVDOT debt service commitments increase.**

Bridges

- **The TAMP highlights a critical challenge to WVDOT's future investments as many NHS bridges will reach the end of their design life by the middle of this decade.** An additional \$50 million per year starting in 2024 has already been committed to the bridge program by State leadership, but the bridge program will need far more funding than projected to address the expected increase in poor bridges this decade to over 40 percent poor.

- **Where else can additional funding for the bridge program come from? One option, as considered in Scenario 2, are transfers from the rest of the capital program, including spending on more discretionary mobility enhancing projects (such as those within the regional mobility program), including road widenings and interchange or intersection improvements.** WVDOH would be able to shift funds upon identifying a reasonable amount for bridge investments followed up by establishing a prioritization process guiding investment decisions for increasingly limited resources targeting capacity enhancements. Developing both prior to the next complete STIP update is advisable, to help justify the shift in funding priorities to planning partners and the public. The evolution of the regional mobility program could also be addressed during the forthcoming update to the Statewide Freight Plan and should account for new Federal priorities and funding direction through the next surface transportation authorization, anticipated to occur in 2021 or 2022.

PROGRAMMING

How does the 2050 LRTP interact with six-year STIP and capital program decisions?

How does the 2050 LRTP influence project priorities in the early scoping for future STIP development?

Strategic connections provide insight into future policy directions for WVDOH that could address long-term bridge and pavement asset management needs. The questions posed through the three scenarios can help determine fundamentally how to address the: balance of NHS vs. Non-NHS pavement investments; the balance between pavement, bridge, and other capital investments; and a path forward for optimizing future performance should new revenue sources become available.

The 2050 LRTP supports the shift WVDOT is making to become a data-driven agency focused on performance management and outcomes – strengthening the linkage between long range planning and capital programming and ultimately program delivery. 2050 LRTP implementation will set the stage to strengthen the linkage at many decision points within WVDOT’s existing planning and programming structure by elevating agency accountability and providing support systems to communicate agency stewardship. Strategic decision support tools and approaches include:

- **Performance management/organizational performance reporting** – Broaden the scope, tracking and reporting of WVDOT’s multimodal system. Most of WVDOTs current system performance reporting is focused on measures required by USDOT. However, with new Federal emphasis areas (multimodal connectivity, resiliency, equity) and as new applications and mobility services come online, it is necessary to consider a shift to incorporate airports, active transportation, transit, and rail performance to reflect integrated, multimodal performance reporting. Additionally, implementing approaches to enable more analytics of existing performance measures, enabling filtering, and downloading of performance data by WVDOH Districts and MPO partners is recommended. More integrated performance reporting through a dashboard or annual report will help communicate accomplishments and strengthen accountability.
- **Tie LRTP goals, objectives to STIP tracking systems** – Use WVDOH’s “Hub,” which is a capital programming system to develop and track implementation of the STIP, to highlight how the 2050 LRTP and other strategic plans support programming decisions and support/report Federal performance-based planning requirements such as programming freight related projects consistent with WV Freight Plan. This connection is a critical part of the System Performance Report required as part of the 2050 LRTP and within performance narratives required for inclusion in the STIP and MPO MTPs.

- **Performance assessment tools** – Evolve the use of the existing trade-off tool to support scenario planning across more systems and performance areas resulting from new State or Federal legislative actions, cash infusions from State or Federal sources, or to test performance implications of new policy commitments.
- **Economic impact and benefit cost assessments** – Standardize approaches to quantify direct, indirect, and cumulative impacts of major projects, programs, or initiatives to communicate the value of transportation investment. Translate these investments in public friendly terms to understand user cost savings associated with safety, reliability, asset management or other operational improvements. Standard assessments also will help WVDOT efficiently and effectively respond to Federal discretionary grant opportunities.
- **Prioritization process** – Establish eligibility, quantitative criteria, calculations, and methodologies to score the technical merits of candidate capacity and operational projects for future inclusion in the STIP. Candidate projects can be sourced from recent plans and studies across the State and MPO LRTPs. Establish an evaluation process to compare project scoring by improvement type, and a cycle to receive candidate priority projects from MPO partners. It is recommended that the Districts are involved in reviewing project eligibility as well as in the scoring and ranking process.
- **Improve decision support tools** – Prioritization processes and benefit cost assessments will require analytical tools to help determine and monetize benefits of certain projects. This could include tools to help assess the benefits of safety, traffic management, and roadway capacity projects as a means to ensure the highest value and most cost-effective projects are being programmed. These tools can also interact with current system performance trends, like the current bridge and pavement management systems, to help identify preferred strategies to address critical performance deficiencies, like a high crash location or an area with a recurring travel time reliability issue.





IMPLEMENTATION PLAN

*How does WVDOT implement the LRTP?
What are WVDOT's actions and overall process to implement the 2050 LRTP by 2030?*

The 2050 LRTP is designed with implementation in mind. As Figure 42 illustrates, each step of the planning process contributes to developing strategies and actions consistent with the WVDOT mission, plan goals, and objectives. Each step of the process is also instrumental to understanding needs and reviewing strategies to address the short- and long-term gap. These efforts culminate in a foundational starting point to operationalize the 2050 LRTP after plan adoption.

One thing is clear, from the COVID-19 pandemic to other trending transportation alternatives, the future will require WVDOT to adapt operations, management, and investment to optimize the performance of the State's extensive assets. WVDOT can seize on these analyses and use the 2050 LRTP as a “north star” to guide short- and long-term strategic decisions cascading through plans, policies, and program delivery. The implementation of the 2050 LRTP helps WVDOT take steps now to position, prepare, and navigate future uncertainties at a critical time in West Virginia.

Establishing a process for plan implementation requires a sustained, multi-year approach to continue engaging Agency staff, stakeholders, and partners to monitor and communicate progress towards stated goals. However, each strategy and action in the 2050 LRTP cannot be implemented simultaneously. Some actions are ready for short term implementation while others require more time, resources, expanded partnerships, or changes to agency policies, protocols, and established roles/responsibilities to enact. At the same time, implementation should proceed in a practical manner that builds on existing agency initiatives and activities without being overly burdensome or prescriptive.

Successful plan implementation should focus on a manageable process to carry the plan forward and serve near-term agency and external partner interests.

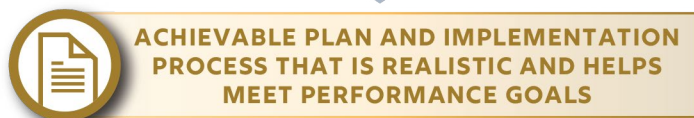


FIGURE 42. FOUNDATION FOR PLAN IMPLEMENTATION

This section presents a summary of highest priority actions proposed for implementation in the next five years and outlines considerations for engaging agency experts and external partners to coordinate, collaborate, and drive priority actions forward. Other priority actions proposed beyond the next five years to 2030 and beyond are documented within materials available on the 2050 LRTP website. WVDOT will use this list to prioritize emerging and new planning, policy, and programming activities in the coming years given available agency resources and evolving priorities.

REFINING ACTIONS

Figure 43 conveys the five portfolios, 23 strategies, and over 70 actions that were organized, screened, and narrowed by category, timeframe and priority. Agency leadership, staff, stakeholders, and partners helped to refine and target actions into three periods—next five years, 6-10 years, and beyond 10 years. Agency experts with related responsibility and external agencies

with a defined support role were recommended for each action. This step included examining trade-offs to consider action readiness, resource availability, and implementation barriers to validate which actions have the highest potential impact in the short term. The review also considered how actions could impact investment decisions through the six-year STIP and which actions require further development to impact future programming cycles through 2030 and beyond.



FIGURE 43. PORTFOLIOS TO ACTIONS

Category – Actions were arrayed against four categories to examine its relevance to agency policies, practices, partnerships, and enabling technologies. Figure 44 provides key questions used to assess and associate each action. This step highlighted the span of actions under consideration and their implication across the agency from policies to guide



FIGURE 44. ACTIONS ASSOCIATED BY CATEGORY

strategic decisions through practices and partnerships that coordinate day-to-day business operations and impact network performance. Actions leveraging technology to automate data collection, streamline communication, or demonstrate cost and time savings were also flagged.

Timeframe – Actions in each strategy were grouped into three timeframes matching realistic implementation potential. Trade-off decisions on the actions considered readiness, resource availability, implementation barriers (for risk management and mitigation), and acceptance or willingness to implement. This review helped distinguish actions with near term measurable benefits compared to actions requiring more time to initiate. The review also helped identify actions with greater inter-agency coordination needs to provide data and resources to make the action real. Figure 45 illustrates actions by timeframe.

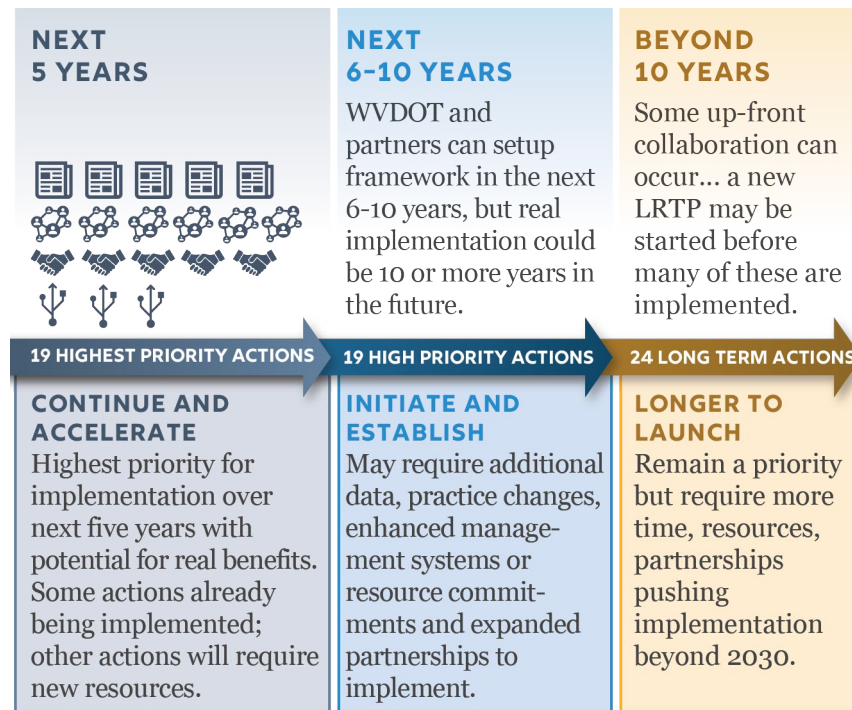


FIGURE 45. ACTIONS GROUPED BY TIMEFRAME

Highest priority actions are tactical, tangible, and measurable opportunities to address the gap through enhanced agency coordination, resource efficiency, leveraging data systems, and/or technologies to address recurring needs. These actions can initiate quickly, utilize existing resources, and advance through current policies, plans, programs, and projects within the next five years. Figure 46 represents the 19 highest priority actions balanced across LRTP portfolios and strategies whose outcomes can impact capital, safety, preservation/maintenance, and operations activities in short term programs like WVDOT's next six-year STIP. These actions also:

- Link to an agency activity partly underway or considered a commitment for WVDOT.
- Fall under the responsibility of a lead [WVDOT agency or division/unit](#) with the experience and expertise to advance the action.
- Represent a best practice opportunity in line with industry standards or acknowledged by agency experts as an emerging area of interest.
- Relate to one another and facilitate greater coordinated data sharing and decision making across internal divisions/units enhancing action accountability.
- Strengthen existing partnerships or support new partner opportunities with Federal, State, regional, local agencies, or private industry.
- Link to WVDOT's mission, priorities, and 2050 LRTP goals/objectives and are highly rated for near term readiness and impact by agency partners and stakeholders to close system performance gaps.
- Connect agency efficiencies and enhanced transportation asset management, safety, operations, environmental sustainability, and multimodal connectivity to address broader statewide public health, economic development, technology, and tourism goals.
- Initiate a more resilient response to emerging demographic, technology, economic, and environmental trends noted in the plan development.

FIGURE 46. HIGHEST PRIORITY ACTIONS

STRATEGY	HIGHEST PRIORITY ACTION	PERFORMANCE RESULT / GAP IMPACT
STRENGTHEN STATEWIDE BRIDGE SYSTEM AND TURNPIKE CONDITION	Link bridge-related asset management and analysis systems for efficient data flow.	Linking bridge and pavement asset management systems will allow for better, data-driven decisions to address the wave of bridge projects expected in the next 10-15 years, while also maintaining high NHS pavement performance and understanding comprehensive non-NHS pavement needs.
STRENGTHEN STATEWIDE PAVEMENT SYSTEM AND TURNPIKE CONDITION	Link pavement-related asset management and analysis systems for efficient data flow.	
	Provide necessary funding amounts to prevent decline in current asset condition.	
STRENGTHEN LOCAL BRIDGE/PAVEMENT SYSTEM CONDITION	Improve and increase communication across offices to leverage best practices.	Better vulnerability assessments and proactive responses to slip failures will help reduce flood events and associated road closures which lead to economic losses for WV residents and businesses.
FOCUS ON STORMWATER AND ROADSIDE MANAGEMENT TO PROTECT AND REPAIR ASSETS	Based on past flood and repair data, identify locations that may need additional attention.	
	Use best-available and sustainable technology in poor-drainage areas to reduce potential stormwater issues.	
INCREASE TRAFFIC SAFETY AWARENESS, EDUCATION & ENFORCEMENT	Reach young drivers through social media and educational programs to emphasize the importance of safe driving decisions.	Reduce the annual 250+ fatalities that occur on West Virginia roadways, particularly the 65% that cite roadway departure as a contributing factor.
	Improve how traffic accident data (injuries, fatalities, and violations) are reported between State and local officials.	
DEPLOY EMERGING TRAFFIC SAFETY COUNTERMEASURES	Install more safety devices, such as guardrails and brighter pavement markings, to prevent crashes.	
EXPAND COVERAGE OF TRAFFIC TECHNOLOGY INFRASTRUCTURE	Update emergency management plans to better coordinate and respond to crashes and make drivers aware of detours to avoid major delays.	Lessen the \$1.4 billion in annual economic cost from crashes in West Virginia, helping to keep the system moving safely around events.
EXPAND THE USE OF ASSET PERFORMANCE TOOLS AND DECISION SUPPORT SYSTEMS	Test more durable and longer-lasting materials for infrastructure such as bridges and pavements.	Increase the life-span of new bridges and pavements in a cost effective manner, 30% of which will need to be replaced in the near future.
EXPAND AGENCY COORDINATION AND FOSTER NEW PARTNERSHIPS	Communicate more efficiently and effectively between West Virginia DOT, other State agencies, local agencies, and other interested partners.	Better internal and external communication will result in resource efficiencies, support staff morale, and help leverage resources across key WVDOT partners.
SUPPORT STATEWIDE MOBILITY MANAGEMENT SERVICES SUPPORT MORE ALTERNATIVE PROJECT DELIVERY AND MANAGEMENT INITIATIVES	Develop plans to coordinate all transit providers within the State to prepare for shifts in commuting patterns.	Integrated local, regional, and statewide mobility options enhances cross coordinated transit service and asset, safety, and security planning.
	Pursue discretionary opportunities from the Federal government and other sources to leverage additional funding for transportation projects.	Secure additional discretionary Federal funding for effective, proven best practice applications to free up State finance burden.

STRATEGY	HIGHEST PRIORITY ACTION	PERFORMANCE RESULT / GAP IMPACT
BUILD SAFE AND CONNECTED ACTIVE TRANSPORTATION NETWORKS	Install cross-state bike route signage and markings and promote cross-state bike routes through the West Virginia Department of Tourism.	Decrease the annual 30+ pedestrian and bicyclist fatalities and increase access for tourism along recreation and scenic routes, creating economic benefits for West Virginia communities.
	Develop a plan to design and construct more sidewalks and trails to provide pedestrian connections.	
EXPAND FREIGHT RAIL MARKET ACCESS AND INTERMODAL OPPORTUNITIES	Plan for and install more crossing safety devices at highway-rail crossings to reduce accidents and limit gate-running.	Increase the number of grade crossings with active warning devices from the current 56% to decrease the 115 crossing incidents reported in West Virginia since 2013.
IMPROVE RELIABLE ACCESS TO WEST VIRGINIA RECREATIONAL AND HERITAGE LOCATIONS	Use the internet and social media to promote access to safe, healthy, and fun outdoor attractions for everyone to enjoy.	Increase the tourism revenue from West Virginia's 50+ national and State parks/recreation areas through convenient and reliable connections.
	Promote areas with real high-speed internet access as broadband expansion continues through the use of WVDOT right-of-way.	Facilitates virtual educational opportunities to raise 83 percent rural high school graduation rate and fosters wider employment options like remote worker lifestyle.

High priority actions could start in the next 6-10 years but may take longer to initiate and establish, pushing real implementation beyond 2030. These actions may require more time to collect data, secure resource commitments, amend protocols or policies, and expand partner coordination to realize and measure change. For actions within this list that do proceed, WVDOT will need to decide how to fund with limited resources as part of future STIPs. If new funding or grant opportunities become available, these actions should be considered. These actions should be further studied and refined as part of relevant future WVDOT strategic planning activities, and then reviewed for priority reclassification in the next LRTP update cycle. [A total of 19 actions were identified in this group.](#)

Long-term actions remain a priority, but require a greater level of time, resources, and deeper agency commitment to launch. Agency research and development activities could occur this decade as resources become

available, however implementation is likely only realistic beyond the next decade. This allows for more initial internal and external collaboration and review during the next LRTP update cycle for priority reclassification if needed. [A total of 24 actions were identified in this group.](#)

Phasing actions by priority helps WVDOT allocate limited resources to the most pressing needs within practices, programs, and project selection. Emerging technology opportunities, new materials, contracting processes, and expanded public and private sector partnerships can also reduce operating costs and enable more efficient, effective project delivery. A lead WVDOT division/unit is proposed to “champion” each action supported by a cross section of State agencies, regional planning partners, and transportation operators to maintain action visibility and spur ongoing accountability to monitor, report, and communicate results.

LOOKING FORWARD

The implementation of the 2050 LRTP should launch with purpose and intention to keep highest priority actions visible and continue to engage internal and external stakeholders. Plan implementation charts a meaningful path to direct limited agency resources and return a high investment value from the planning process. Maintaining an agency focus on plan implementation comes with inherent challenges and opportunities, especially given WVDOT's sizeable system responsibilities and external factors that demand agency leadership and staff attention. Policy and practice changes take time to develop, incorporate into agency procedures, and institute with staff. Other short-term factors—such as unforeseen economic changes, new State or Federal requirements, or urgent crises/extreme events (natural or man-made), can preoccupy staff time, impacting implementation schedules. To the extent possible, highest priority actions should reflect realistic, flexible schedules that adapt to these changing conditions. Other critical steps for transitioning to plan implementation include:

- **Establish a dedicated implementation page** – The 2050 LRTP website is an ideal platform to convey plan progress and serve as an ongoing repository for plan resources. Updating the site with a dedicated link to implementation maintains visibility of the 2050 LRTP and draws attention to the implementation process, progress, activities, and accomplishments. This step would leverage a communication resource familiar to WVDOT's numerous planning partners, stakeholders, and State/local agencies. Over time the page could evolve to include a dashboard or annual report to convey the status of priority actions and accomplishments. The site can also serve as a single location to link to all the WV “family of plans” noted below.
- **Align the “family” of WV plans** – The 2050 LRTP functions as a policy “umbrella” to guide, align, and provide direction to other statewide, regional, and MPO MTP updates that WVDOT and

its partners can undertake within the next decade. Connections between the 2050 LRTP and these plans can provide bi-directional benefits depending on update cycles. The 2050 LRTP can inform updates to forthcoming system or mode specific plans within the “family,” while updates to those plans can inform the next WVDOT LRTP update. The TAMP, Freight Plan, SHSP, and Rail Plan are scheduled for updates within the next five years. WVDOT can review highest priority actions and technical outcomes (state of the system, trends, needs/revenue forecasts) to inform the development of those plans creating greater analytical consistency and cross plan integration. Federal regulations require TAMPs to incorporate 10-year budget and future scenarios for NHS bridge and pavement preservation. The next TAMP update can start from the same model outputs and 2050 LRTP performance scenarios while incorporating new funding assumptions, condition and trend changes, or risk and resiliency considerations within its updated planning period.

- **Resource regional and local plans** – MAP-21 and the FAST Act encourage improved coordination between WVDOT and MPOs. This occurs routinely in West Virginia through STIP/TIP coordination and more recently through target setting in response to new Federal Transportation Performance Management requirements. Priority actions and technical outcomes from the 2050 LRTP can serve to inform the development of MPO Metropolitan Transportation Plans (MTPs)/LRTPs in an effort to review plan elements (such as multimodal needs and alternative revenue forecasts) that intersect with regional specific needs, project priorities, and local system performance. Coordination points and opportunities can occur within the next year as six out of eight MPO MTP/LRTP updates are in-progress or soon to begin. Coordination opportunities can extend beyond MPO MTPs/LRTPs to RPDC or Appalachian Regional Commission (ARC) studies or other corridor and transportation mode specific assessments such as the ongoing WV Airport Economic Impact Study.

- **Inform future LRTP updates** – Institutionalizing plan implementation provides a reporting mechanism of activities and accomplishments to communicate future LRTP updates. The scope of the next WVDOT LRTP (i.e., 2055) will be directed by the progress on highest priority actions and accomplishments. Each successive plan update can operate this way to establish a rhythm and external partner expectations to make the planning process more dynamic and integrated. Additionally, future plan updates provide an opportunity to revisit and update trends, assumptions and new industry conditions or State/Federal requirements that may refine or redirect highest priority actions. Other external factors such as significant land use changes or economic development investments that alter freight movement between LRTP update cycles, can be part of a continuous process to review asset performance impacts and adjust needs assumptions in future LRTP updates.
- **Incorporate implementation best practice from other State DOTs** – Peer State DOTs are strengthening how policies in their long-range transportation plan filter down to guide and direct decisions within mode-specific and systems related plans. Formalizing this relationship can align and better link long term transportation recommendations to shorter term investments and system priorities. Over time, this supports the WVDOT “planning lifecycle” to enable agency resources to holistically achieve enhanced mobility, asset, operational, and safety performance as a result of better coordinated planning activities.



