



Transportation 2050

Long Range Transportation Plan





ACKNOWLEDGEMENT

Pathways to the Future: Transportation 2050 was prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration, Virginia Department of Transportation, and the Virginia Department of Rail and Public Transportation. This report also represents the collective work of state, regional, local and special interest representatives of the RRTPO 2050 Long-Range Transportation Plan Advisory Workgroup.

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Chapter One

Executive Summary

Long Range Transportation Plan

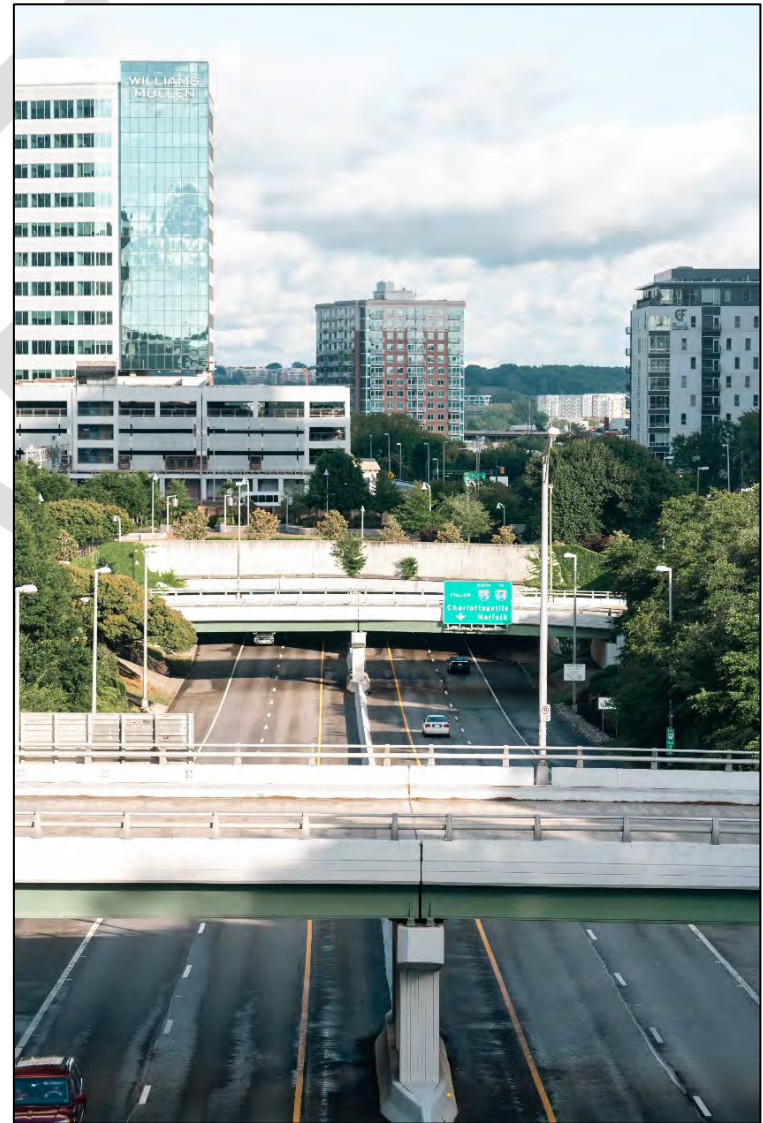


2050

Chapter 1 - Executive Summary

Transportation 2050 represents the 25-year vision for the community's transportation needs and expectations. It considers all types of travel and identifies projects that will best serve bicyclists, pedestrians, people using public transportation, and occupants of single-occupancy vehicles, as well as ensure the efficient movement of goods and services.

A coordinated transportation plan for the Richmond region's future depends on a clear understanding of how people and goods move around the region and country today and how these movements are expected to occur in the next 20 to 25 years. Every five years, planners at PlanRVA, along with partners from member localities, the Virginia Department of Transportation (VDOT), and the Virginia Department of Rail and Public Transportation (DRPT) bring their expertise to the development of the long-range transportation plan. Regional plan development is influenced by ideas and opinions of community members participating in public meetings, workshops, and surveys. The last plan was adopted in 2021 and evaluated needs through 2045; *Transportation 2050* projects regional needs out to the year 2050.



What is *Transportation 2050*?

The RRTPO is a federally mandated and funded transportation policy-making body serving as a Metropolitan Planning Organization (MPO) made up of representatives from local government and transportation providers. The RRTPO provides planning guidance for how federal funding for transportation projects and programs is applied in the Richmond Region, with one of its major activities being the management of the long-range transportation plan.

The long-range transportation plan is a federally mandated document guided by a vision, guiding principles, goals, and objectives. It addresses comprehensive transportation needs of the region over at least the next 20 years, with updates added every five years.

Transportation 2050 is the latest five-year update. It is a multimodal plan that makes recommendations for transit, bicycle, pedestrian, air, road, and freight-related projects with identified short-term and long-term strategies.

Transportation 2050 includes three major focus areas to meet the ever-changing mobility needs of the region:

- 1. Identify what's needed:** *Transportation 2050* identifies all the transportation projects anticipated to be needed over the next 20 years to handle future growth. The plan assesses how the projects collectively affect the transportation system by analyzing such factors as policy, demand for services from future population and employment growth, changes in transportation technology, and community input about what transportation improvements are desired moving forward.
- 2. Create a cost-affordable plan:** *Transportation 2050* identifies which needs can be funded with available transportation revenues from federal, state, and local sources, and considers all modes of travel. With input from the public and the RRTPO member localities, transportation needs are addressed by project, ranked and prioritized using approved technical criteria, and placed in an implementation timeline.
- 3. Consider Future Uncertainty.** The future is uncertain. Long Range Planning, by design, looks far enough ahead to capture substantive regional change in land use, economics, and other regional dynamics that can shift future outcomes. Through use of scenario planning, *Transportation 2050* considers how the future transportation system will meet the plan's Objectivities across a range of different plausible futures.

What was the planning process for *Transportation 2050*?

The long-range planning process includes:

- Evaluating the current transportation system and existing conditions in the region;
- Developing projections of population and employment growth to the year 2050;
- Creating a travel demand model to help predict future impacts of transportation decisions;
- Developing vision, goals and objectives to guide the plan (**see boxes to the right**);
- Identifying issues and needs for the region;
- Locating and describing problems with the current system;
- Developing a Universe of Projects, containing possible solutions to meet identified needs and issues;
- Understanding the ability of the region to afford the range of possible improvements; and
- Creating a budget-realistic (or constrained) plan of projects by time bands.
- Evaluating the future transportation system against the plan's Objectives in a range of different plausible futures.

Transportation 2050 was a multi-year process that began in 2024 and was completed for public review on July 29, 2026. It was considered for adoption by the RRTPO Policy Board on September 10, 2026, with the plan's schedule having provided a variety of opportunities for the community to get involved.

2050 Vision

The transportation system in the Richmond Region will reliably and safely connect people, provide opportunities for all to thrive and live healthy lives, promote a strong economy, and respect conservation of natural resources.

2050 Goals

Goal A: Safety

A transportation system where no one is killed or seriously injured, and people feel secure and comfortable regardless of how they travel.

Goal B: Sustainability:

A cleaner transportation system that provides choices and meets the needs of the current generation and provides the same opportunity for future generations.

Goal C: Reliability:

A consistent and predictable transportation experience for all people regardless of how they travel.

Goal D: Resiliency:

A transportation system that prepares, withstands, and recovers quickly from disruptions caused by natural disasters, extreme weather events, and other emergencies.

What's required for *Transportation 2050* to be effective?

Federal and State Requirements

Transportation 2050 was developed to be consistent with Federal and State requirements. Federal transportation reauthorization legislation acts update federal laws and regulations and direct the approach and amount of federal transportation funding. The most recent is the Infrastructure Investment and Jobs Act (IIJA) (also known as the Bipartisan Infrastructure Act/BIL). As with previous transportation laws, the IIJA included a series of metropolitan planning factors that ensure that the work of the RRTPO is based on a continuous, cooperative, and comprehensive process.

RRTPO is also responsible for following and carrying out other federal laws pertinent to transportation planning, such as federal nondiscrimination and environmental protection laws. These and other federal laws, policies and programs set the context for state and regional transportation planning, including updates to regional Long-Range Transportation Plans (further described in Chapter 2).

Community Input & Engagement

Federal and state guidelines and requirements set the larger framework for *Transportation 2050* and ensure that the plans for all metropolitan areas are consistent in process and basic content. Engaging the public through a variety of involvement activities during the plan development process is vital to accurately capture the needs and collective vision for the area and region.

Engagement with public and community stakeholders occurred throughout the process of updating Transportation 2050. Public engagement was carried out in accordance with the LRTP Public Engagement Strategy adopted by the RRTPO Board and RRTPO's Public Engagement Plan. In particular, the needs assessment, the vision, goals, and objectives, and the investment programs and projects in the plan reflect public engagement during each stage of development. Members of the community shared thousands of comments, ideas, and survey responses about the region's transportation needs, investment priorities, and opportunities for improving the transportation system. Much of the active discussion has taken place through an Advisory Workgroup that is representative of the community.

An effective plan will also have a solid foundation, consisting of a framework of established local, comprehensive, and other regional and short-term transportation plans. It is a unifying document that considers and builds upon the projects and initiatives of all local and regional transportation implementing agencies for a cohesive plan. *Transportation 2050*

comprehensively considers other plans and initiatives within and around the Richmond Region, sets priorities, and applies fiscal constraint to develop the most accurate picture of the region's future transportation system.

Provides Resources for Regional Planning

Transportation 2050 provides valuable source material and resources for planning and implementing improvements to the overall transportation system. Elements of the process include:

- Socioeconomic Data Analysis & Growth Forecast Analysis, 2017-2050;
- Richmond/Tri-Cities Regional Travel Demand Model & Regional Land Use Model for assessing impacts;
- Project Prioritization Process using quantifiable data to measure project impacts on performance metrics within the four goal categories;
- Supporting studies and plans including the State of Transportation Report, Richmond Regional Structural Inventory & Assessment Report, and Congestion Management Process Report;
- Comprehensive Financial Plan projecting potential investment from all available funding sources including those possible for allocation through the Central Virginia Transportation Authority (CVTA) over the next 25 years. See Chapter 6 for a full accounting of projected resources; and
- Scenario Planning models (data and analysis tools) representing a range of different plausible futures.

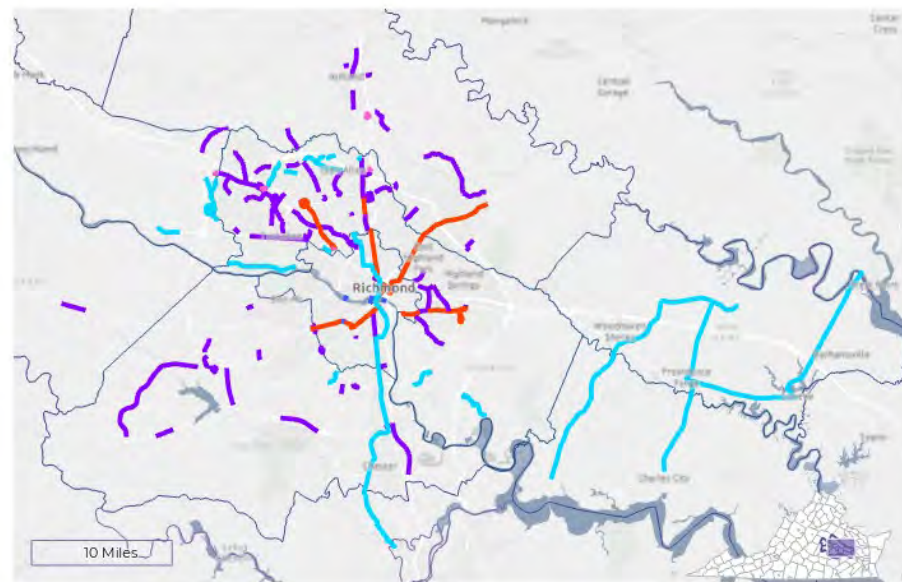
Why is *Transportation 2050* important?

The RRTPO has served as a collaborative table for the region's localities and partner transportation agencies since the first long-range transportation plan was developed in 1980. At that time, the study area was much smaller in geographic scope and the plan was limited to new highway facilities and a transit element. The region and its urbanized area have grown and so have the needs for addressing a wider variety of modes of travel for people and goods. Adopted in 2016, *plan2040* was the first to consider financial projections from DRPT in addition to those provided by VDOT. The next update of the LRTP in 2021, *ConnectRVA 2045*, built on those previous projections by acknowledging the diversity of available financial resources, recognizing the necessary commitment to environmental stewardship, and focusing attention on equity toward a multimodal future. It also used performance measures to both identify priority projects and evaluate project effectiveness for all communities. *Transportation 2050* continues these practices and furthered the analysis of past plans by considering

multiple financial investment scenarios, as well as by assessing how well the proposed projects meet the region's needs across a spectrum of possible futures.

This plan is intended to be an active tool used by decisionmakers to prioritize and implement regional transportation projects, collectively contributing to a better quality of life for the Richmond Region.

[View Interactive Map of Transportation 2050 Projects](#)



Constrained Projects

- Highway
- Transit
- Park and Ride
- Active Transportation
- Bridge





Chapter Two

Introduction

Long Range Transportation Plan



2050

Chapter 2 - Introduction

The Richmond Region is defined as the area covered by PlanRVA, which is comprised of the City of Richmond, the Town of Ashland, and the counties of Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, and Powhatan (Exhibit 1). The Richmond Region covers 2,165 square miles and is located approximately 100 miles south of Washington D.C. and midway between Atlanta and Boston.

According to the *2050 Long Range Growth Forecast Analysis* (see *Technical Report A: Socioeconomic Data Report*), the region had a population of 1.1 million people as of base year 2017. The Richmond Region is forecasted to grow to over 1.46 million residents by 2050. The largest gains in population are projected in the three largest localities, Chesterfield, Henrico and the City of Richmond. In percentage terms, New Kent, Goochland, Powhatan and Chesterfield are expected to see the highest population growth. This regional population will live in approximately 580,600 households; an increase of over 153,000 households compared to the base year.

The City of Richmond is the capital of the Commonwealth of Virginia. Regional employers provide more than 550,000 jobs for area residents as of base year 2017, with Henrico County as the region's largest employment center. The region is forecasted to reach 716,943 jobs by 2050.

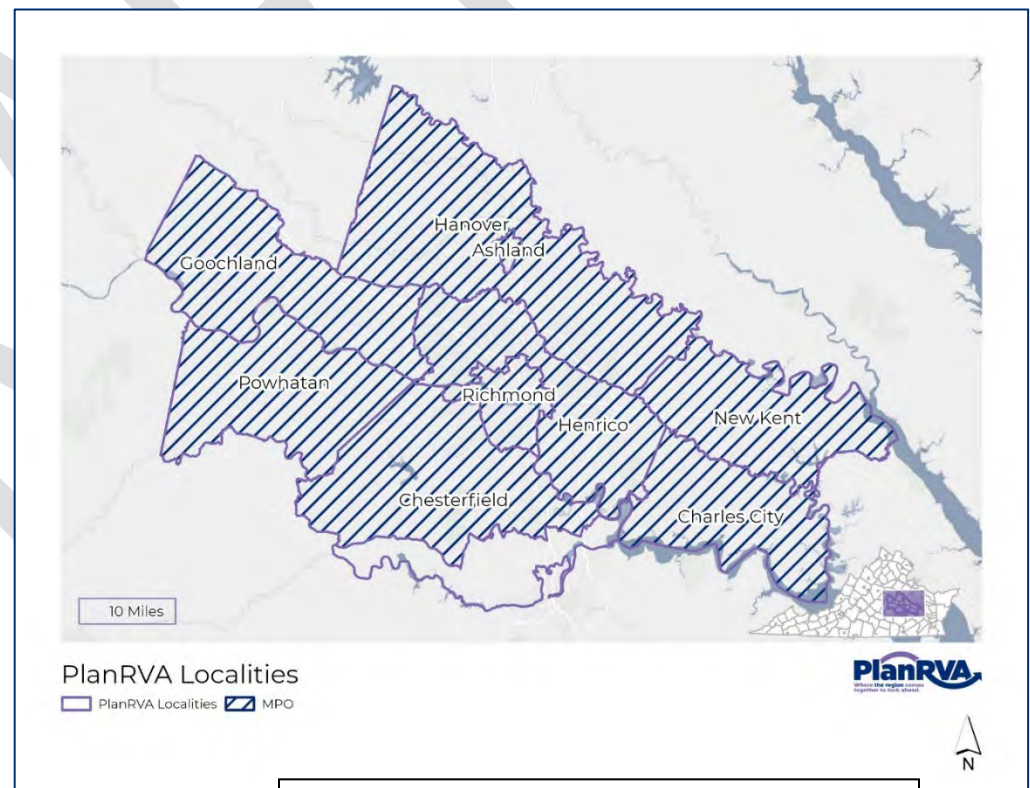


Exhibit 1. Richmond Region and TPO/MPO Study Area

The region serves as home to Virginia Commonwealth University, the University of Richmond, Virginia Union University, Virginia State University, Randolph Macon College, and Reynolds and Brightpoint Community Colleges with a collective enrollment of approximately 76,000 students as of base year 2017.

The region's strategic location, South of Washington D.C. and West of the Hampton Roads coastal area, positions it to capitalize on the opportunities offered by its geography. The region is well served by the interstate transportation network, with I-95 and I-64 intersecting near its center. Routes 295 and 288 form an outer circular beltway system, and businesses and residents both benefit from the relatively short 28-minute work commute, on average. Rail access provides connections to East coast and Midwest markets, and the region is well positioned to capitalize on anticipated increases in freight movement through the Richmond Marine Terminal and the Port of Virginia in Hampton Roads.

The region includes both a well-developed urban core surrounded by older suburban neighborhoods and traditional subdivisions expanding into the more sparsely populated rural counties. The City of Richmond is the densest center of population, with the emerging development pattern of a higher density ring following major thoroughfares extending from the center to meet the outer expressways. However, the Southeastern quadrant of the region represents a noticeable departure from this concentric pattern. The James River creates the natural boundary while Route 895 provides a connection between the I-295 bypass and I-95 with potential to facilitate more development in coming decades. Employment densities following much the same pattern start to merge with population concentrations to define activity centers throughout the region.

Richmond Regional Transportation Planning Organization (RRTPO)

The Richmond Regional Transportation Planning Organization (RRTPO) coordinates transportation plans and policies as the Metropolitan Planning Organization (MPO) for the region. The RRTPO is a policy-making organization made up of local elected officials from each of the region's nine member jurisdictions, state and federal transportation agencies, and area transportation service/system operators. PlanRVA serves as lead staff providing administrative and technical services for the RRTPO. The Virginia Department of Transportation (VDOT) and the Virginia Department of Rail and Public Transportation (DRPT) provide additional technical support.

The RRTPO structure includes a decision-making Policy Board and a standing Community Transportation Advisory Committee (CTAC) and Technical Advisory Committee (TAC). Special purpose committees, sub-committees and work groups are established as needed and may include representatives from the TPO member organizations and various

groups and organizations from throughout the region. One such special purpose committee, the LRTP Advisory Workgroup, guided the *2050 Transportation* update.

The RRTPO serves as the forum for cooperative regional transportation decision-making. The RRTPO develops the region's transportation plans and programs in cooperation with the state and transit providers. The LRTP is one of the primary regional transportation documents produced by RRTPO, together with the Transportation Improvement Program (TIP), the Congestion Management Process (CMP), and Unified Planning Work Program (UPWP). RRTPO must prepare these documents for the region to comply with federal requirements and receive federal transportation funds.

The LRTP is used to guide a region's planning while reflecting the vision and goals of the region. The LRTP is federally mandated to cover at least the next 20 years; the RRTPO creates a 25-year plan and updates it every five years. Under federal law, the plan must be "financially constrained," meaning only revenues that can reasonably be expected can be considered in funding the recommended projects within the LRTP.

Member Jurisdictions and Partner Agencies

The following nine jurisdictions in the region are voting members of the RRTPO, with the number of votes apportioned according to population indicated in parenthesis:

Charles City County (1)
Chesterfield County (4)
Goochland County (2)
Hanover County (3)
Henrico County (4)
New Kent County (2)
Powhatan County (2)
City of Richmond (4)
Town of Ashland (1)

Partner agencies that hold one vote include the Capital Region Airport Commission, Greater Richmond Transit System (GRTC), Richmond Metropolitan Transportation Authority (RMTA), and VDOT (as the Secretary of Transportation's designee). Non-voting members represent other RRTPO committees and partner agencies.

TPO Study Area

Under federal requirements, the study area for the RRTPO must encompass both the existing urbanized area and contiguous area expected to become urbanized during the time period covered by *Transportation 2050* (for this document the horizon year is 2050). It must also cover areas designated by the Environmental Protection Agency (EPA) under the Clean Air Act as part of the non-attainment / maintenance area for air quality standards.

To ensure that the plan covers all urbanized areas, air quality attainment areas, and areas expected to become urbanized by 2050, the study area has been defined to include the entirety of all localities in the region other than Chesterfield County. For Chesterfield County, a majority of the County is included in the RRTPO study area, and the remainder, which includes those areas of the County near Hopewell, Colonial Heights, and Petersburg, is contained in the Tri-Cities MPO study area. The RRTPO 2050 study area is shown on Exhibit 1.

While the Study Area for this plan is as described above, there is on-going coordination between RRTPO and Tri-Cities Area MPO (TCAMPO) in recognition that these agencies serve a single urbanized area, anchored in the use of a single Regional Travel Demand Model - the Richmond/Tri-Cities (RTC) Model. Cooperation and integration of datasets for this plan and future planning efforts help ensure coordinated transportation planning for the larger region.

Federal Guidance on Transportation Planning

Federal transportation reauthorization legislation acts to update federal laws and regulations and direct the distribution and amount of federal transportation funding. The most recent is the Infrastructure Investment and Jobs Act (IIJA) (also known as the Bipartisan Infrastructure Act/BIL). The IIJA re-authorized the core federal surface transportation program for five years and provided one-time stimulus funding to be distributed through multiple grant programs, as well as amending federal laws and leading to updated federal regulation and guidance (see box). The IIJA continued the Metropolitan Planning Program, with joint oversight by the Federal Highway Administration and Federal Transit Administration. Since 2025, Executive Orders, Department of Transportation Orders and other actions have contained updated federal transportation guidance and priorities.

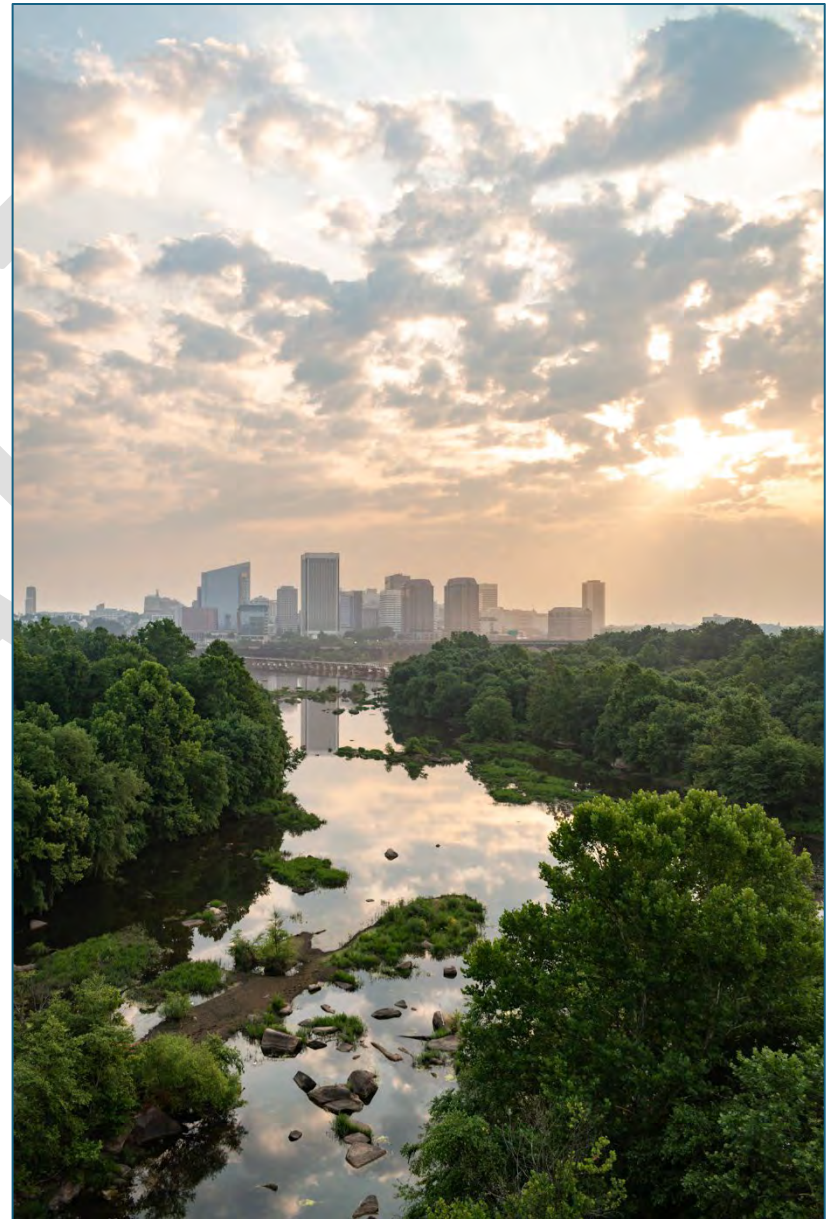
RRTPO is also responsible for following and carrying out other federal laws pertinent to transportation planning, such as federal nondiscrimination and environmental protection laws as shown in the box. These and other federal laws, policies and programs set the context for state and regional transportation planning, including updates to regional Long-Range Transportation Plans (further described in the Regional Transportation Planning section below).

Federal Transportation Acts

2021. Infrastructure Investment and Jobs Act (IIJA). Following passage of this Act, the Federal Highway Administration and Federal Transit Administration jointly issued updated planning emphasis areas for use in MPO transportation planning process. The planning emphasis areas included Complete Streets, Public Involvement, Planning and Environmental Linkages (consideration of environmental, community and economic goals early in the transportation planning process), Equity, and Climate Change/Resilience.

2015, Fixing America's Surface Transportation Act (FAST Act). This Act updated national transportation goals, which include Safety; Infrastructure Condition (maintaining state of good repair); Congestion Reduction; System Reliability; Freight Movement and Economic Vitality; Environmental Sustainability; and reduced project delivery delays. The FAST Act continued and reinforced the performance-based approach established in MAP-21, with updated performance measures relevant to the national goals. The FAST Act also amended the federal planning factors required for MPO planning (see Regional Transportation Issues section below).

2012. Moving Ahead for Progress in the 21st Century Act (MAP-21). Established the national transportation goals (23 USC 150) and marked a significant shift in the Federal-aid highway program by introducing a performance-based planning and programming framework. The primary objective was to ensure greater accountability and transparency by linking federal funding to progress toward achieving specific national performance targets.



Other Key Federal Law

Other key federal laws pertinent to transportation planning include the following:

Title VI of the Civil Rights Act of 1964 and related nondiscrimination laws. Title VI of the Civil Rights Act of 1964 (Title VI) states that “no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance” (42 USC 2000d). In addition to Title VI, there are laws that prohibit discrimination on other grounds. Those laws include:

- a. Section 162(a) of the Federal-Aid Highway Act of 1973 (23 USC 324), which prohibits discrimination based on sex;
- b. Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, which provide protections for disabled persons; and the
- c. Age Discrimination Act of 1975, which applies to age.

RRTPO is obligated to adhere to, and is committed to, achieving full compliance as detailed in its Title VI Plan.

The Clean Air Act Amendments (CAAA) contains provisions for the metropolitan transportation planning and programming process in the nation’s designated non-attainment and maintenance areas. The Clean Air Act’s primary goals are the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS), and the prevention of significant deterioration of air quality in areas cleaner than the NAAQS. The NAAQS establish the maximum pollutant concentrations that are allowed in the outside ambient air. EPA requires that each state submit a State Implementation Plan (SIP), including any laws and regulations necessary to enforce the plan that outlines how pollutant concentrations will be reduced to levels at or below the standards. This achievement is referred to as “attainment.” Once pollution levels fall below the standards, the state must also show how it plans to keep these levels at the reduced amounts, referred to as “maintenance.” The CAAA requires transportation plans and programs to conform to the SIP for each applicable air quality standard. The air quality plans quantify pollution reduction needs and commit to reduction strategies through the SIP, transportation control measures (TCMs), and conformity provisions for transportation planning. See the Air Quality section in Chapter 3 and *Technical Report K: Regional Air Quality Conformity* for additional information.

The National Environmental Policy Act, known as NEPA, established the requirements and processes Federal agencies must consider related to the environmental effects of Federal Highway Administration proposals and actions. For recipients of Federal funds, that means that before proceeding with final design, right-of-way acquisition, and construction, environmental consequences and alternatives must be evaluated that would avoid or lessen project impacts.

Environmental Justice

The purpose of environmental justice is to avoid, minimize or mitigate disproportionately high and adverse human health or environmental effects on low income and minority populations; to ensure full and fair participation of low income and minority populations; and to prevent the denial of benefits to those same populations. Historically, minority and low-income populations have been identified as the largest disenfranchised group, both in terms of equal access to transportation supply and ability to influence change. Environmental justice seeks to ensure equal access to transportation systems and to the transportation planning process for everyone regardless of race, color, creed, or national origin.

Two federal laws noted above, the Civil Rights Act and the National Environmental Policy Act (NEPA), along with the Federal Aid Highway Act of 1970, Executive Order 12898 of 1994, and the subsequent U.S. DOT Order on Environmental Justice (DOT Order 5610.2) of 1997, formed the regulatory framework for environmental justice considerations. Under this framework, TPOs receiving federal funds were expected to identify residential, employment, and transportation patterns of low-income and minority populations; identify the distributions of benefits and burdens of the transportation system on these populations; and evaluate and improve the public involvement process to eliminate participation barriers and engage minority and low-income populations in transportation decision making.

In January 2025, the 1994 Executive Order and U.S. DOT Order on Environmental Justice cited above were rescinded and revoked. However, the other federal laws remain in effect, and there is pertinent guidance in Virginia specified in the Virginia Environmental Justice Act (VEJA) which declares it the official policy of the Commonwealth to provide fair treatment and meaningful involvement to all people, regardless of race, color, national origin, income, faith or disability, in the development, implementation, and enforcement of any environmental law or policy. In addition, the agency's Regional Strategic Plan, adopted in June of 2025, includes as one of its Vision themes "Opportunity and Choice for Everyone" (see Regional Transportation Planning section below). The RRTPO's LRTP Public Engagement Strategy and Public Engagement Plan, adopted in 2024, guided *Transportation 2050* community engagement, which sought to ensure equal access to the transportation planning process for everyone through its community engagement approach. In addition, analysis in the plan included system-level evaluation of the proposed transportation projects for Environmental Justice factors, as described in Chapter 7.

Statewide Transportation Planning

The Commonwealth of Virginia prepares a statewide transportation plan, VTRANS, which is adopted by the Commonwealth Transportation Board (CTB). VTRANS was adopted in 2015 and has been updated over time, including an updated to the transportation vision in 2025 (**see box**). VTRANS includes guiding principles, goals and objectives, and identifies key infrastructure for the state, such as Corridors of Statewide Significance. VTRANS guides state transportation funding processes, and the plan is a key consideration for regional planning throughout the state.

VTRANS Transportation Vision

“Virginia’s best-in-class multimodal transportation system provides safe and reliable mobility, connects people and commerce, fosters economic growth and investment, embraces environmental stewardship, and enhances quality of life.”

Regional Transportation Planning

RRTPO’s planning processes, including development of the LRTP, are directed by federal and state laws and guidance. Federal law contains specific provisions for metropolitan planning and the processes undertaken by MPOs. Federal law states that it is in the national interest to:

- Encourage and promote the safe and efficient management, operation, and development of surface transportation systems through metropolitan and statewide transportation planning processes that will serve the mobility needs of people and freight, foster economic growth and development within and between States and urbanized areas, better connect housing and employment, and take into consideration resiliency needs while minimizing transportation-related fuel consumption and air pollution; and
- Encourage the continued improvement and evolution of the metropolitan and statewide transportation planning processes by metropolitan planning organizations, State departments of transportation, and public transit operators as guided by the planning factors (**see box on next page**).

Federal law states that to accomplish these objectives, metropolitan planning organizations, in cooperation with the State and public transportation operators, shall develop long-range transportation plans (LRTP) and transportation improvement programs (TIPs) through a performance driven, outcome-based approach to planning for metropolitan areas of the State. The process for developing LRTPs and TIPs shall provide for consideration of all modes of transportation and shall be continuing, cooperative, and comprehensive (3-C process) to the degree appropriate.

Federal law and regulation include many additional provisions that guide development of LRTPs, or that are pertinent for any MPO planning process. These include, among other things, information to be considered, data and analysis approaches, state and local coordination, fiscal considerations, and stakeholder and community engagement. RRTPO developed *Transportation 2050* following federal law and guidance for metropolitan planning through the process described below and in other Chapters.

Federal Planning Factors

- Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency
- Increase the safety of the transportation system for motorized and non-motorized users
- Increase the security of the transportation system for motorized and non-motorized users
- Increase accessibility and mobility of people and freight
- Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight
- Promote efficient system management and operation
- Emphasize the preservation of the existing transportation system
- Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation
- Enhance travel and tourism.

In addition to federal and state transportation planning alignment, this transportation plan is a component of the Richmond region's strategic plan. The 2025-2030 Regional Strategic Plan: *Pathways to the Future* was adopted by the PlanRVA Commission Board on June 12, 2025. The Plan's Regional Strategic Vision (**box below**) guides strategic planning efforts across the agency and the region by identifying five key interconnected themes for which PlanRVA and our partners strive.

Transportation 2050 is one of a set of core topical plans which make up the Regional Strategic Plan. In addition to *Transportation 2050*, the Regional Strategic Plan includes regional plans that focus on hazard mitigation, air quality/climate action, community and economic development, and natural resources. *Transportation 2050* also connects to PlanRVA's work within the regional *RVA Rising* effort to ensure upward economic mobility for all. This approach through the Regional Strategic Plan helps align data, tools, and planning efforts across the topical areas, which helps further the intent of the 3-C process discussed above.

Regional Strategic Vision

Strategic and Resilient Infrastructure. A region with infrastructure and systems designed and maintained to protect and enhance individual and community health and well-being.

A Healthy Environment. A region with thriving ecosystems - healthy watersheds, clean air, fruitful working lands, flourishing habitats, and communities that are located and planned in ways that recognize the connections between environmental health and human health and well-being.

Attainable Housing. A region with diverse housing stock that makes attainable housing options for everyone that are safe, comfortable, resource-efficient, and built in coordination with available or planned infrastructure and services.

A Strong Economy. A region with a diverse and resilient economic base, an educated and skilled workforce, employment that enables workers to meet their family needs, and communities with the physical, structural and social conditions to support and attract employers, workers and visitors.

Opportunity and Choice for Everyone. A region that engages and collaborates with all voices and creates pathways to success through access to jobs, housing, infrastructure and services, quality education, a healthy environment, and other elements that allow all individuals and families to thrive.

Locality Planning

While federal and state laws and programs provide direction, decisions at the local government level drive the region's specific needs. Local governments have control over zoning and development approvals and guide their overall land-use pattern through Comprehensive Plans and other planning documents. These choices guide the amount and location of housing, jobs, and commercial centers; the density and mix of land uses; and the degree of street connectivity and walkability. In turn, these factors influence how far people travel, which modes they may be able to use, and the volume of regional traffic.

Therefore, local governments play a key role in developing the candidate projects included in the LRTP.

Transportation Funding

Transportation projects, even those of modest scale, typically involve significant investment of public funds. The majority of funding for major transportation projects has traditionally come from federal and state sources. Federal, state, and regional programs and processes help guide expenditures to align with priorities outlined in federal law, state and regional transportation plans, and other documents. Funds are allocated through a variety of programs, which vary in funding approach (automatic or competitive) and what types of activities or projects are eligible (safety projects, bike or pedestrian projects, etc.). Even with multiple sources of transportation funding, transportation improvement needs typically exceed the funding that is available. It has long been the practice through federal legislation for the regional transportation needs to be deliberated through established MPOs, such as RRTPO. RRTPO manages the evaluation of projects and distribution of regional funding to the member organizations, and this practice helps coordinate and advance needed infrastructure across the region. Chapter 6 describes how the regional goals and objectives stated in Chapter 4 inform project prioritization for *Transportation 2050*, as well as how projected funding then informed development of the plan's constrained project list. The box on the next page provides a high-level snapshot of the different transportation funding; this box does not include rail funding details since this region does not receive rail funding through the MPO.

Transportation Funding Snapshot

Federal transportation funding is money provided by the U.S. government to plan, build, operate, and maintain transportation systems such as roads, bridges, transit, rail, and related infrastructure. The Highway Trust Fund (HTF) is the source of funding for most programs. The HTF consists of the Highway Account, which funds highway and intermodal programs, and the Mass Transit Account. Most federal funding flows to the states, which then determine how the federal apportionments will be allocated. Some federal funding is distributed to states and metro areas via discretionary grant programs, such as Local and Regional Project Assistance (BUILD) and Nationally Significant Freight and Highway Projects (INFRA).	Motor fuel taxes are the major source of revenue for the HTF. Since 2008, Congress has frequently authorized substantial transfers from the Treasury's general fund to keep the HTF solvent and cover the gap between revenue and expenditures.
State transportation funding is money collected and managed by state governments to plan, build, operate, and maintain transportation systems. The Commonwealth Transportation Fund (CTF) is the source of funding for most programs. The CTF includes federal funding as well as state revenue.	In Virginia, state revenue for transportation comes from motor fuels tax, vehicle registration, highway use fees, and other sources.
Regional. Some regions within Virginia have been authorized by the General Assembly to establish regional transportation authorities and generate revenue through regional taxes. The Central Virginia Transportation Authority (CVTA) was created specifically to address the needs of central Virginia (PlanRVA footprint). Organized in August of 2020 following action by the Virginia General Assembly, this regional agency has the power to identify transportation projects and programs and commit funding to their development and construction. CVTA partners with local governments and state agencies to enhance multimodal opportunity, maintain and grow infrastructure, and ensure long-term viability of transportation investments.	The CVTA generates revenue through regional taxes; the majority from a 0.7% regional sales tax, with the remainder coming from a wholesale tax on gasoline and diesel fuel.
Local. Localities can use local funds to wholly or partially fund transportation projects through their Capital Improvement Programs (CIPs).	Funded through local taxes, such as property tax revenues, and revenue from cash proffers.
Other. In some localities, some transportation projects are funded and/or constructed by private developers, such as roads or road improvements identified through the development review process and undertaken by land developers in accordance with proffers, conditions or other development agreements. Another funding approach is the use of private funding through public-private partnership projects (e.g., Pocahontas Parkway) often paid back through user fees.	Land development proffers and conditions; user fees such as tolls.

Long-Range Transportation Planning Process

The process for preparing *Transportation 2050* included eight phases:



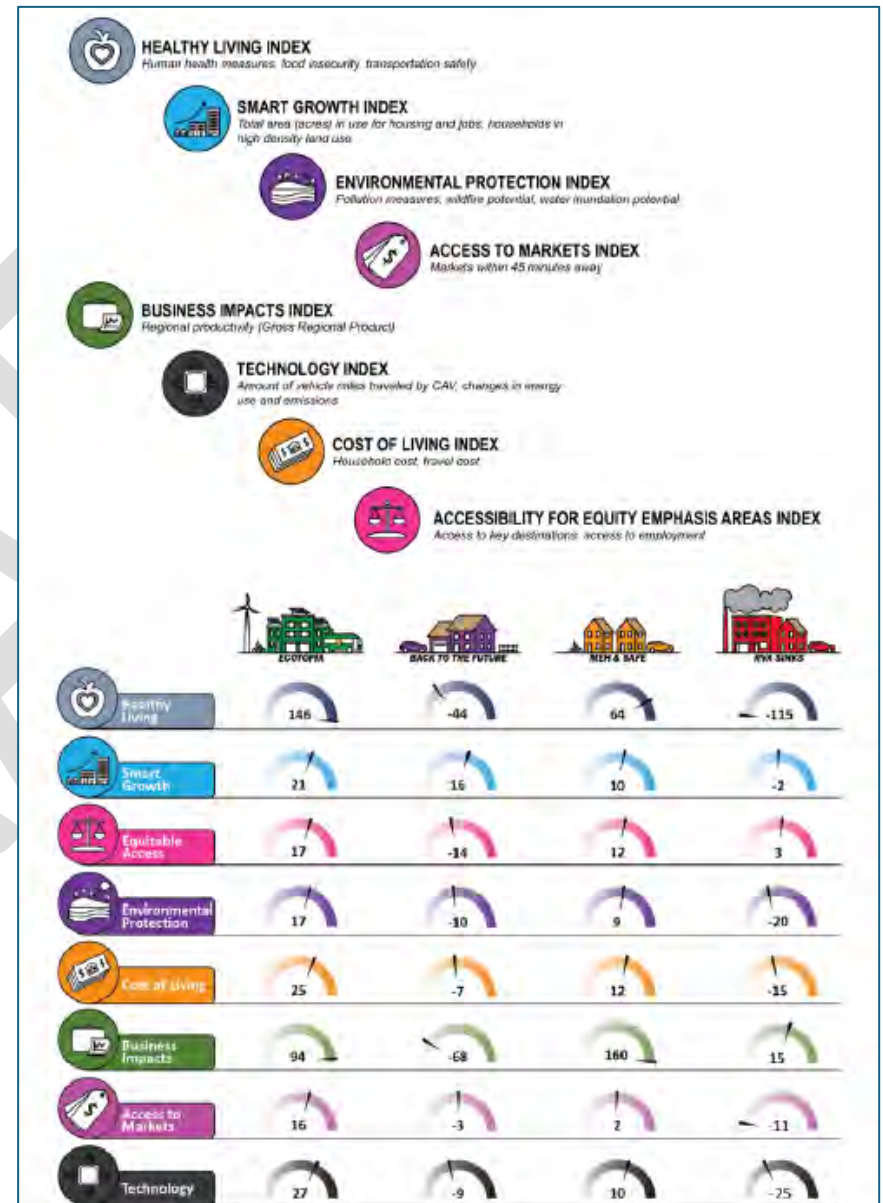
2050 LRTP Workflow

- 1. 2050 Baseline Data Development**
- 2. Scenario Development – Possible Futures**
- 3. Strategic Direction**
- 4. Transportation System Assessment**
- 5. Universe of Projects**
- 6. Project Prioritization/Constrained Plan**
- 7. Plan Evaluation**
- 8. Plan Adoption**

The table below provides information about each of the plan phases, the data considered and analysis used, and where this work is reflected in the plan and technical reports. Engagement with the public and subject matter stakeholders occurred throughout the process and is described below in the Public Engagement section.

Phase	Data and Analysis		Discussed in Plan Chapter or Technical Report:
1. 2050 Data Development	- Growth Assumptions - Regional Demographic and Economic Data	2022-2023	Technical Report A: SE Data Report for 2017 Base Year/2050 Forecast Year Used for analysis in the project scoring (prioritization) process, Chapter 6, and plan evaluation, Chapter 7.
2. Scenario Development – Possible Futures	- Baseline and Four Alternative Futures Scenarios - Scenario Tools Development	2023-2024	Technical Report E: Scenario Planning Process Report Used for analysis in the project scoring (prioritization) process, Chapter 6, and plan evaluation, Chapter 7.
3. Strategic Direction	- Regional Vision and Guiding Principles - Planning Goals, Objectives and Strategies	2024-2025	Chapter 4.
4. Transportation System Assessment	- Existing Transportation System Analysis	2024-2025	Chapter 3; Technical Report B: Richmond Regional Structural Inventory & Assessment Report 2024; Technical Report C: State of Transportation Report; Technical Report D: Congestion Management Process Report
5. Universe of Projects	- Transportation Issues and Needs - Project Selection Guidelines - Universe of Candidate Projects Development	2025-2026	Chapter 5; Technical Report F: Universe of Projects Report.
6. Project Prioritization, Constrained Plan	- Project Prioritization Process and Tools Development - Transportation Revenues and Budget - Fiscal Constraint Guidelines - Funding Scenarios - Constrained Plan - Unfunded Transportation Needs	2025-2026	Chapter 6; Technical Report G: Project Prioritization Methodology; Technical Report H: Assumptions for Travel Demand Modeling; Technical Report I: Constrained Plan Development Report
7. Plan Evaluation	- Systemwide Transportation Performance Evaluation - Future Scenarios Evaluation - Air Quality Conformity	2026	Chapter 7; Technical Report H: Assumptions for Travel Demand Modeling; Technical Report J: Constrained Plan Evaluation Report; Technical Report L: Regional Air Quality Conformity Assessment
8. Plan Adoption	- Draft Plan and Story Map - Policy Board Plan Adoption (September 2026) - Plan Transmittal to FHWA and FTA (October 2026)	2026	Technical Report K: Public Participation and Outreach Summary; Technical Report M: Federal Compliance Report

Phase 2, Scenario Development, is the first time that exploratory scenario planning has been included as part of RRTPO's LRTP. The cross-disciplinary process used 11 models to analyze a baseline, business-as-usual scenario and four additional, plausible scenarios. Varying assumptions about drivers of change and growth forecasts differentiated the additional scenarios. Input from a committee of subject-matter experts and the public informed the scenario assumptions for drivers of change, including housing preferences and demand, flooding and other natural hazards, economic growth, and technological change. Results from the scenario analysis are summarized on an indices dashboard, allowing for comparison of performance measures and strengths and weaknesses of each scenario. A project dashboard summarizes how results for each scenario differ from the baseline scenario across eight quality-of-life indicators. See *Technical Report E: Scenario Planning* for additional information.



Public Engagement

Public and subject matter stakeholder engagement occurred throughout the eight phases of LRTP development.

In Phase 1, development of socioeconomic data (e.g., population and jobs forecasts) which underpinned the LRTP as described in *Technical Report A: Socioeconomic Data Report for the 2017 Base Year and 2050 Forecast Year*, was guided by the RRTPO Socioeconomic Data Workgroup, which included state, regional, local, and special interest representatives.

In Phase 2, the Scenario Planning development process included engagement of the public and subject matter stakeholders in the formation of the Scenario Planning Advisory Committee, surveys seeking input on potential drivers of future change and on scenario modeling results, and participatory in-person charettes.

Throughout the remaining phases, the LRTP Advisory Working Group (AWG) met from 2024-2026 and included state, regional, local, and special interest representatives as subject matter experts. The AWG guided development of all plan components, meeting fifteen times over the course of the process. In addition, the standing RRTPO committee: Community Transportation Advisory Committee (CTAC), provided strategic input and sharing throughout the process.



Engagement with the public occurred throughout 2024-2026. A focus for *Transportation 2050* was to return to update and re-engage with consistent groups at three designated points in the process to build relationships and share how feedback was incorporated throughout. Engagements were scheduled in coordination with open input times to gather feedback right then and/or encourage participation via the online input tools.



PlanRVA went to where the community was wherever possible, by attending events and engaging directly with identified community groups throughout all nine localities and Tribes.



The LRTP public engagement process was carried out in accordance with the *LRTP 2050 Public Engagement Strategy* (box at right) and RRTPO's overall Public Engagement Plan (both found in *Technical Report K: Public Engagement*).

Input was gathered for:

- Vision/Needs/Wants (including Issues Mapper)
- Goals and Objectives
- Investment Scenario Packages
- Final Draft Review

A dedicated engagement page: "[Transportation 2050 \(LRTP\)](https://engage.planrva.org)," was created using our Engagement Platform: engage.planrva.org. The "Transportation 2050 (LRTP)" page was the place for the public to engage with project surveys, input tools, and information on the background, timeline, FAQ, and relevant documents. The page can be translated into the ten most-used languages in the region. To assist partners and the community in sharing information, the page included toolkits with social media-formatted text and images in English and Spanish. Information was shared via the PlanRVA channels: website, three social media platforms, and newsletters.

Overall, RRTPO received thousands of comments, ideas, and input about the region's transportation needs, investment priorities, and opportunities for improving the transportation system (see *Technical Report K: Public Engagement* for a detailed breakdown).



Three major engagement periods were centered around:

A) Transportation Vision/Needs/Wants and Issue Mapper

A short survey asked the public to rate importance of tradeoffs in planning (e.g. maintenance, interconnectivity), feelings of safety, what they want us to know about getting around the region, what they'd like to change, and how we can build trust.

The Issue Mapper interactive tool invited the public to identify successful transportation projects, where need was, how to categorize them (safety, congestion, etc.), and to visualize how we move regionally.

A) How Was Feedback Used?

Built buy-in for the process with opportunity to educate on importance of input. Informed issues and needs analysis and development of the Universe of Projects (See Chapter 5).

B) Investment Scenario Packages

Projects were grouped into four investment scenario packages. The public was asked to rate each, choose a preferred option, and understand cost, mode share, and location of potential projects.

B) How Was Feedback Used?

Influenced project prioritization and development of the final list. Identified gaps in our explanation of mode breakdown.

C) Review of Draft Plan

Staff shared how public feedback was used in the plan and asked the public to review plan and provide comments. In addition, interested members of the public were invited to consider participating in follow-up focus groups to provide feedback about the public engagement process for this plan and potential future improvements.

C) How Was Feedback Used?

Provided understanding of and public perspective to decision-makers approving the Plan. Informed future plan engagement strategy.

Chapter Three

Existing Transportation Network and Regional Conditions

Long Range Transportation Plan



Chapter 3 – Transportation Network and Regional Conditions

The region's transportation network is an essential system for movement, enabling access to work, services, social, recreational opportunities, and allowing movement of goods critical to the region's economy. Roadways serve individual passenger and freight vehicles but also serve other transportation modes including the region's fixed-route and on-demand transit services, and many of the region's sidewalks, bike lanes, and other active transportation facilities. Rail lines and airport and port facilities are also integrated components of the region's transportation network.

This chapter describes these components of the region's existing transportation network, how elements of our current system perform (e.g., congestion levels), and some of the types of planning that lay the foundation for future improvements across the transportation modes.

This chapter also describes the regional context for our transportation network, reflecting on the many topics that impact, and are impacted by, transportation. More details can be found in *Technical Report C: State of Transportation*, and the State of Transportation [StoryMap](#).

Transportation Network At-A-Glance

- 1 Major Airport
- 400 Miles of Railway
- 4 Railway Stations
- 1 Major Transit Provider - GRTC
 - 1,700 Stops
 - 690 Miles of Routes
 - 95 Square Miles of LINK zones
- 9 Park and Ride Lots
- 1,630 Miles of Sidewalk
- 192 Miles of bike infrastructure
- 864 Miles of roadway in the LRTP Network
- 870 Bridges
- 640 Culverts

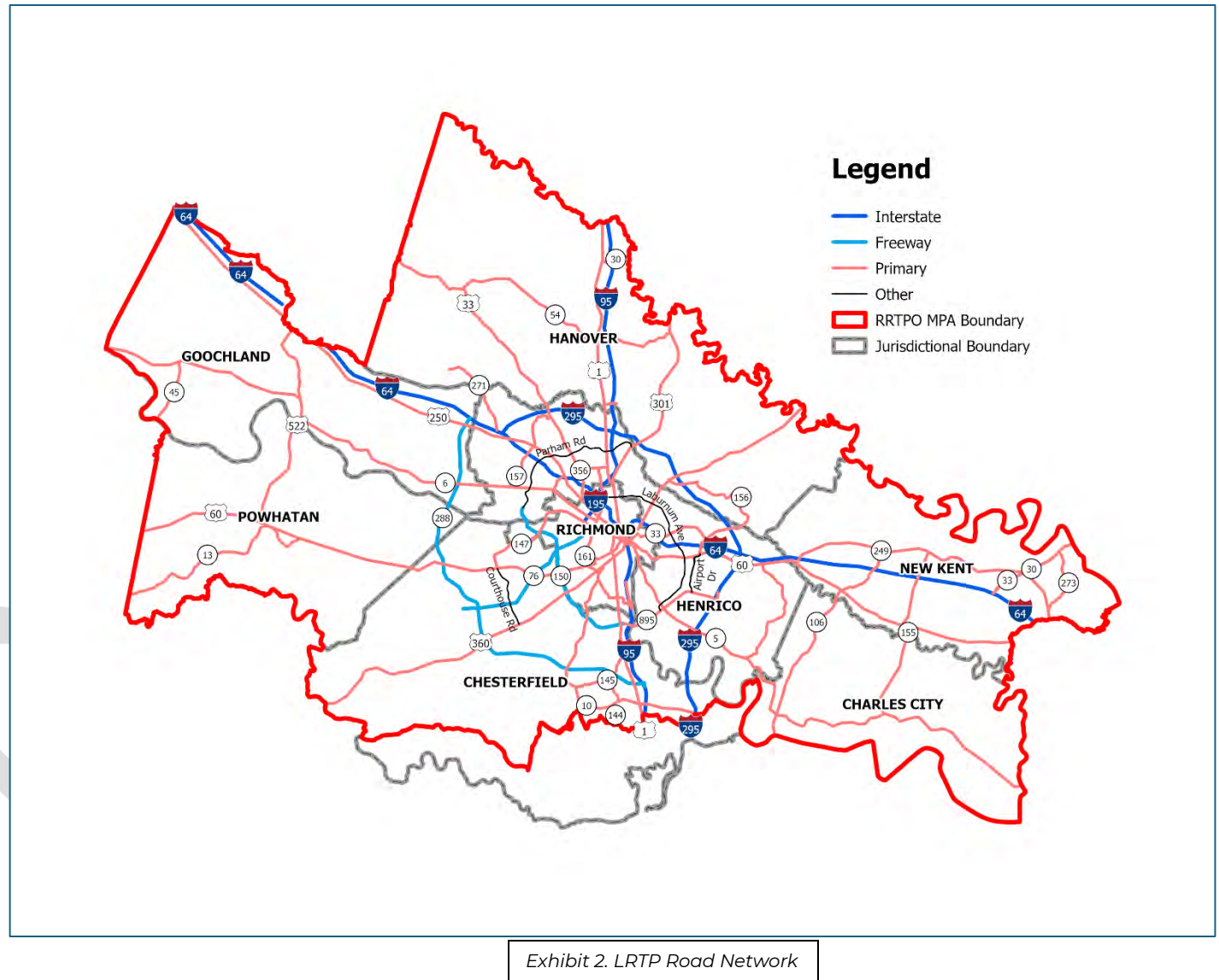
Numbers are approximate.

CHAPTER 4 LISTS THE PLAN'S VISION, GUIDING PRINCIPLES, AND ITS GOALS, OBJECTIVES AND STRATEGIES. BOXES THROUGHOUT THIS CHAPTER HIGHLIGHT CONNECTIONS BETWEEN THE INFORMATION IN THIS CHAPTER AND OUR TRANSPORTATION SYSTEM GOALS.

Highways

The region has an extensive network of highways and major roads. These roadways serve a variety of roles, from streets within neighborhoods that provide a high level of access to adjacent uses, to interstate highways that quickly move high volumes of vehicles across the region. These various roadway types are organized in a Functional Classification system that includes “local,” “collector,” and “arterial” roadways based on their levels of access, mobility (ability to move freely and easily between locations) and traffic volume.

Transportation 2050 focuses on a subset of roadways whose Functional Classification indicates that they are major roadways with significance for the regional transportation network, including arterial roads classified as interstates and freeways. These major roadways make up the “LRTP Road Network,” as shown in Exhibit 2 and further described in Chapter 6.



Reliability and Predictability

The ability to consistently access jobs and destinations directly relates to travel reliability on the region's roads. For this reason, monitoring traffic congestion is an important part of transportation planning. One of the primary ways RRTPO identifies, monitors and reduces roadway congestion on a subset of the region's key roadways is through the Congestion Management Process (CMP). The CMP, found in *Technical Report D: Congestion Management Process*, uses available traffic volumes, travel times, and performance metrics such as the Planning Time Index (PTI) and Level of Travel Time Reliability (LOTTR) to highlight major areas of congestion.

Overall, the CMP report's data suggests that travel times are generally reliable and efficient in both the morning and afternoon, with most indicators reflecting stable conditions. While there are instances of increased travel times and congestion, particularly in the afternoon, most vehicles are moving at efficient speeds. The analysis highlights a well-functioning transportation network, albeit with some variability that may require additional planning. While the roadway network generally provides a high level of reliability, the CMP report includes a ranking and map of the most congested areas in the region (Exhibit 3).

**GOAL C: RELIABILITY
ADDRESSES
CONSISTENT AND
PREDICTABLE TRAVEL.**

Ranking	Road Segments
1	I-64 from exit 76B to entrance ramp near Arthur Ashe Blvd and Robinson St
2	I-64 from exit 186 to the alternate side exit 79
3	S Belvidere St between W Canal St and E Byrd St
4	E Parham Rd and Chamberlayne Rd
5	I-64 between N Belvidere St and exit 78
6	S 14 th St between E Cary St and E Main St
7	Staples Mill and W Broad St
8	N Belvidere St between W Broad St and Downtown Expressway
9	Pocahontas Trail and New Kent Highway
10	I-64 between I-95 to Mechanicsville Turnpike

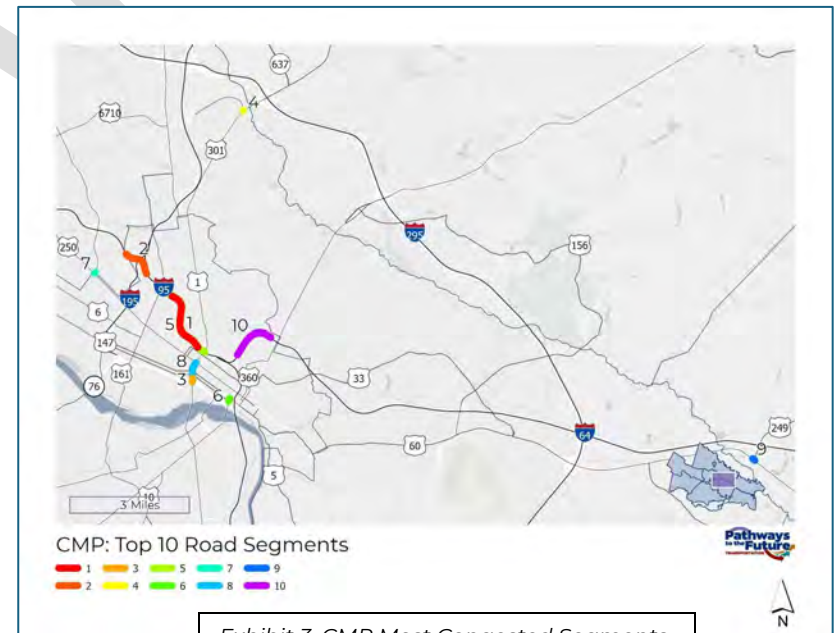


Exhibit 3. CMP Most Congested Segments

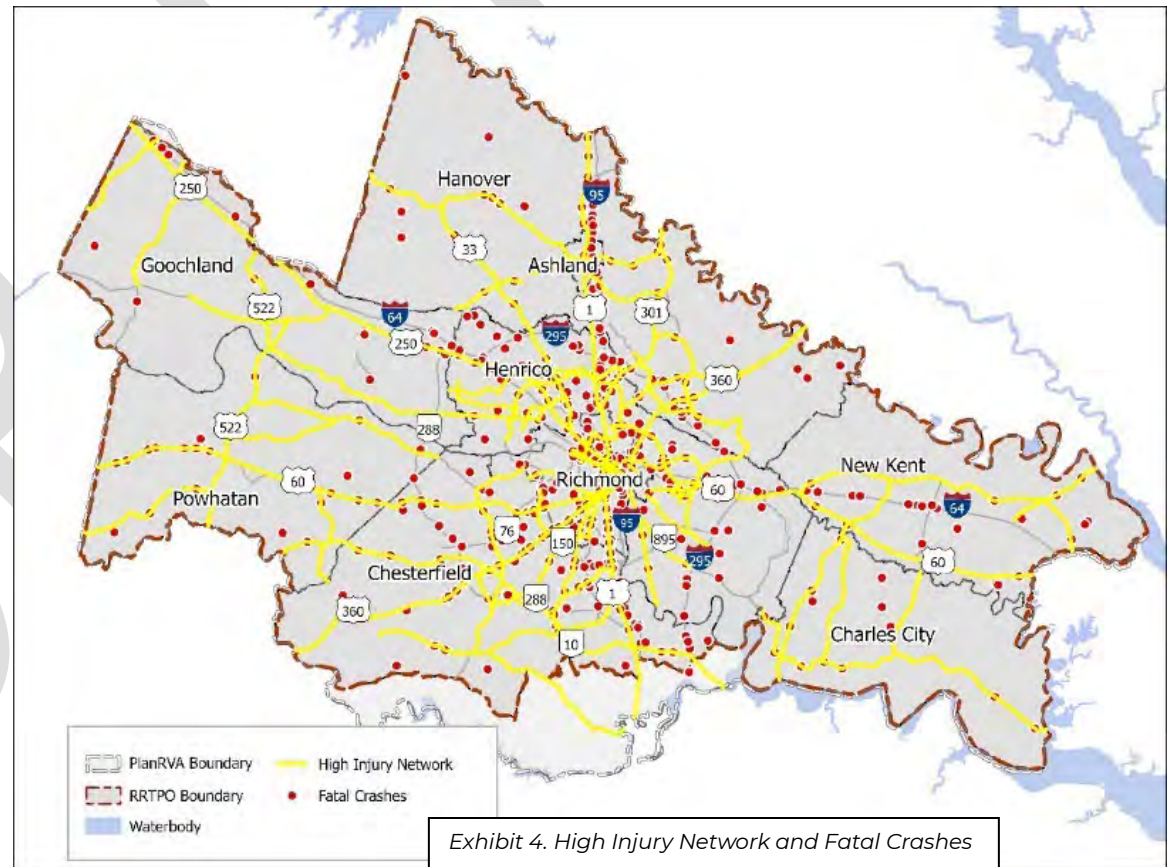
Safety

The safety of everyone traveling on the roadway network is critical, regardless of travel mode. The latest data shows that one person dies every three days on our roadways, and that two to three people are seriously injured each day on our roads. Between 2019 and 2023, 871 people were severely injured in traffic crashes each year, suffering from such conditions as severe burns, broken bones, and paralysis, which can have life-long consequences even after the injuries are no longer visible. Of the people killed or seriously injured each year, 109, or 11%, are killed or injured while biking, walking, or rolling.

Using data from 2016 to 2020, a set of roads has been identified as the High-Injury Network (HIN)—roads that account for an outsized share of the serious crashes. These roads make up just 8.2% of the total network but are responsible for 62.9% of crashes that kill or and serious injure someone. Exhibit 4 shows the HIN in yellow and the location of fatal crashes in the region.

Despite recent efforts, the number of people killed on our roads continues to climb. Over the past decade, the average number of people killed each year has increased by 43%, climbing from a low of 81 people a year in 2016 to the current rate of 116 each year. While serious injuries have slightly declined and the number of people injured or killed while outside of a vehicle has generally stayed flat, these trends have seen reversals in recent years. Overall, the region's progress toward zero traffic deaths and serious injuries has slowed significantly over the past decade, consistent with overall national trends.

**GOAL A: SAFETY
ADDRESSES
TRANSPORTATION
SYSTEM SAFETY
CONSIDERATIONS**



Condition

Proper maintenance of the region's roadways is fundamental to achieving safe and reliable travel. For a majority of the RRTPO, including New Kent, Powhatan, Hanover, Goochland, and portions of Chesterfield within the TPO, VDOT maintains the roadways. For The City of Richmond, The Town of Ashland, and Henrico, the localities maintain their own roadways. Additional toll roads are maintained by other public and private entities.

Roadway Pavement

Of the 12,587 RRTPO pavement segments reported on by VDOT a majority, 54%, are within the Excellent, Good and Fair categories and determined to be "Sufficient." The remaining 46% of segments are categorized as Poor and Very Poor and considered "deficient." The pavement conditions data provided for the 10,749 segments maintained by the City of Richmond shows many segments, 81%, in the Good, Satisfactory, and Fair conditions. The remaining 19% are considered Poor, Very Poor, or Failed. Pavement condition data was not available for Henrico during the LRTP update timeframe.

**GOAL C:
RELIABILITY
ADDRESSES
THE
CONDITION
OF REGIONAL
PAVEMENT
AND
STRUCTURES.**

Bridges, culverts and tunnels

In part due to the region's many rivers and waterways, the RRTPO footprint is dotted with "structures" such as bridges, culverts, and tunnels. Most of these structures are part of the roadway network, though there are some associated with other modes, such as rail. Recent data for the region shows a total of 1,509 structures, 870 bridges and 639 culverts, with an average age of 46 years old. Of those, there are 50 Bridges, and 16 culverts rated "poor" that account for 4.3% of structures in the RRTPO. Structures that are given a "poor" rating mean that there are elements of the structure that need to be repaired or monitored further. The fact that a bridge is given a "poor" rating, does not mean it is unsafe, and it does not imply that the bridge is likely to collapse. In 2024, VDOT designated created "cusp" as an additional condition categorization. Structures that fall into the "cusp" category are ranked just above "poor" and are given this designation as they are on the cusp of being poor and should therefore be monitored more closely and repairs begun. 32.4% of structures in the Richmond Region are considered "cusp" structures, and the remaining 63% of structures in the Richmond Region are in the "fair" and "good" categories.

A more in-depth look at the condition of structures is included in the *Technical Report C: Richmond Regional Structural Inventory & Assessment Report*.

Transit and Passenger Rail

The Richmond region offers a transit system that integrates various modes of transportation, including bus rapid transit, local fixed-route bus, intercity buses, rail services, and multimodal support through park-and-ride facilities. These elements work together to reduce traffic congestion, improve accessibility, and promote sustainable mobility across the region.

Regional Transit Service

The Greater Richmond Transit Company (GRTC) is the primary transit provider operating in the Richmond region. GRTC operates multiple services tailored to meet the transportation needs of the region:

Bus Rapid Transit (BRT): The Pulse BRT offers high-frequency east-west service primarily along Broad and Main Streets, connecting Rocketts Landing to Willow Lawn through downtown Richmond. Features such as dedicated lanes, transit signal priority, and enhanced stations make this an efficient transit option for residents and visitors.

Local Fixed-Route Buses: GRTC provides coverage with routes that link neighborhoods, shopping areas, and healthcare facilities primarily within Richmond, Henrico, and Chesterfield. Goochland also has limited access to the fixed-route network.

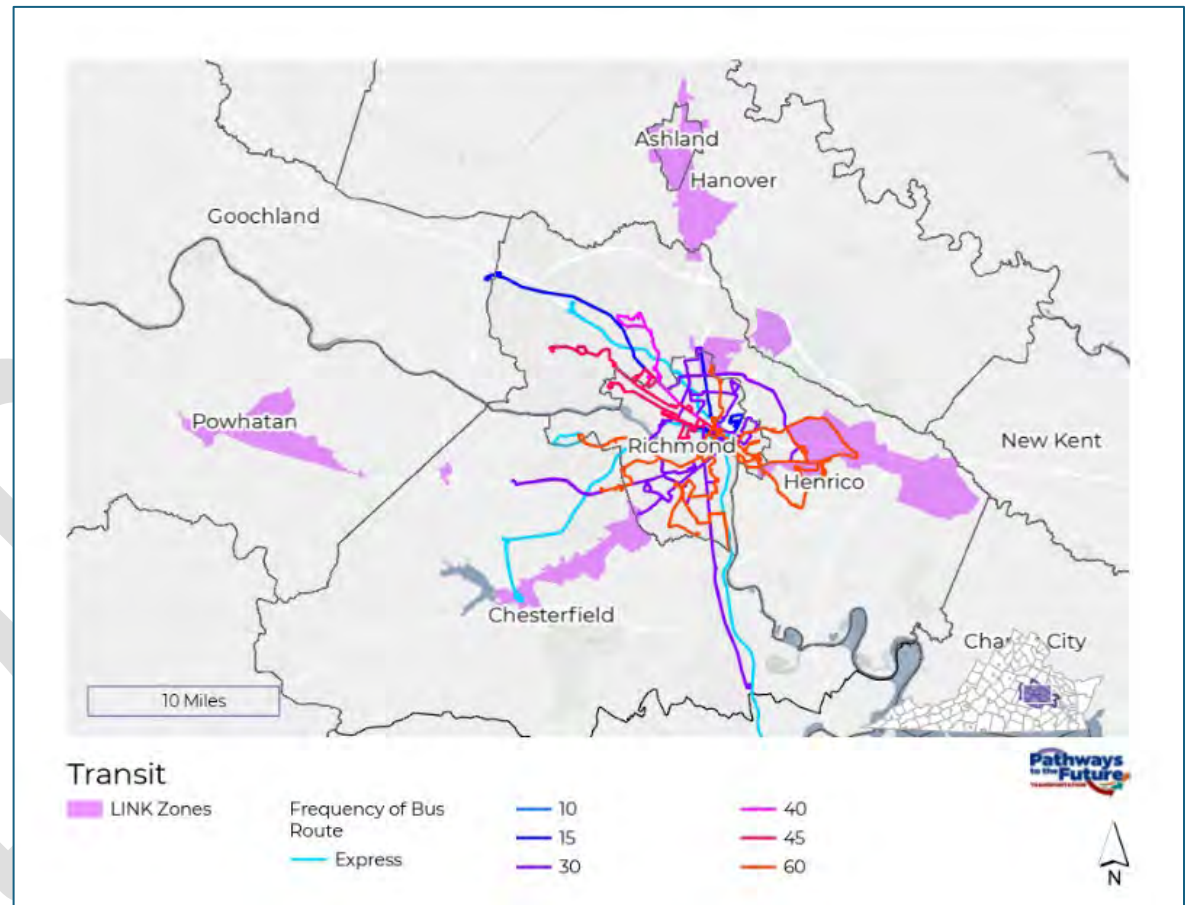


Exhibit 5. Transit System Components

Express Buses: These peak-hour services connect suburban areas, including park-and-ride locations, to downtown Richmond and other employment centers, providing faster commutes by minimizing stops. An express route also links Richmond to Petersburg with four departures every weekday.

LINK Microtransit Zones: The app-based LINK service operates in select areas, offering flexible, on-demand rides. This service complements the fixed-route network by covering low-density regions and addressing first-mile/last-mile gaps.

Paratransit Services. Community Assisted Ride Enterprise (CARE) is an ADA-compliant paratransit service that ensures individuals with disabilities have access to curb-to-curb transportation. The service covers Richmond and parts of Henrico and Chesterfield counties, offering essential mobility to destinations such as hospitals, retail centers, and workplaces.

Airport Connection. GRTC provides three types of free service to RIC, including high-frequency bus service, LINK service (in certain zones), and Uber vouchers.

Other parts of the GRTC and GRTC operations include bus stops, vehicles, and facilities such as the current temporary transfer station. Additionally, the planned permanent hub to be located at 500 N. 10th Street will serve as a central nexus for bus routes and further stimulate downtown economic growth.

In addition to GRTC, other transportation services in the region include Bay Transit, Goochland Cares, and Hanover Dash, as further detailed in the [2025 Rural Transportation Analysis Report](#).

GRTC Service

GRTC has ramped up its regional transit improvements by not only increasing service frequency but also expanding its network to better connect communities across the Richmond region. Two major projects currently underway:

The westward extension of the existing Pulse BRT line will push the current route from Willow Lawn Drive to Parham Road. The project will improve frequency and integration with the existing system and incorporate a small park-and-ride facility to serve growing demand in Henrico County.

The new north-south BRT line will start at Azalea Avenue and Brook Road in Henrico County, continue through a series of key thoroughfares, and terminate at Stonebridge Plaza in Chesterfield County. By creating this new north-south link, GRTC intends to provide a rapid, high-capacity service that not only cuts travel times but also enhances access to jobs, education, and community services. This project is designed to integrate with existing routes and to support equitable transit access across the region.

Intercity Bus Services

Richmond is a hub for several intercity bus operators, providing direct connections to destinations across the region and beyond:

- **Virginia Breeze:** This state-supported intercity bus service offers multiple routes through Virginia, including connections from Richmond to Blacksburg and Northern Virginia, expanding affordable travel options throughout the state. The Tidewater Current is a new service that connects Harrisonburg to Virginia Beach through Richmond.
- **Megabus:** Connects Richmond with Washington, D.C., New York City, and several Virginia cities, including Danville, Farmville, Martinsville, and South Boston.
- **FlixBus:** Offers direct routes from Richmond to major cities along the eastern seaboard, including D.C., Norfolk, Raleigh, Charlotte, Philadelphia, and New York.
- **Wanda Coach:** Provides regional connections with direct routes from Richmond to cities along the I-95 corridor.

These services operate from central locations in Richmond, often integrating with GRTC's local transit network to provide seamless transfers.

Park-and-Ride Lots and Car/Vanpools

Park-and-ride lots play a vital role in facilitating multimodal commuting by enabling residents to park their personal vehicles and transfer to public transit, carpools, or vanpools. GRTC offers Park-N-Ride lots that are served by several routes, including Express service to the downtown Business District.

Carpool and Vanpool services are primarily coordinated through RideFinders, which further expands mobility options for residents who do not have access to direct transit. As of December 2024, there were 75+ vans arriving and departing from the Richmond Region with an additional nine vans comprising the Commuter Connections/OmniRide's program. Vanpool destinations include Washington D.C./Northern Virginia, Blackstone, Prince George County, and Hampton Roads.

**BOTH GOAL B:
SUSTAINABILITY
AND C:
RELIABILITY
RELATE TO
DESIRED FUTURE
TRANSIT**

Official park-and-ride locations in the Richmond region include:

- Bottoms Bridge
- Cogbill/Hopkins/Chippendale
- Gaskins Road*
- Glenside Drive – Dumbarton*
- Hickory Haven
- Mechanicsville
- New Kent County Public Works
- Oilville
- Parham Road*
- Rt. 360 at Career/Tech Center

Unofficial lots include:

- Bon Air Baptist Church*
- Commonwealth 20*
- Huguenot United Methodist Church
- White Oak Village*

Passenger Rail

The Richmond Region rail network provides critical links for efficient, low-cost, environmentally friendly movement of people and goods throughout the state and beyond. The region is served by both of Virginia's Class I railroads, CSX and Norfolk Southern, and limited short line railroads. The region is a key connection between the Southeast High-Speed Rail (SEHSR) corridor, which runs from Washington D.C. to Atlanta, and the Northeast Corridor (NEC), which connects north to Boston, New York, and Philadelphia. Amtrak offers several routes through Richmond, including the Northeast Regional, Carolinian, Palmetto, Silver Meteor, Silver Star and Floridian. The Department of Rail and Public Transportation (DRPT) and

the Virginia Passenger Rail Authority (VPRRA) are key agencies in Virginia that plan and implement improvements to the state and regional rail system. Among other projects, planned improvements to several of the region's rail stations and to the Richmond Layover Facility at Fulton Yard will improve passenger service in the region in coming years.

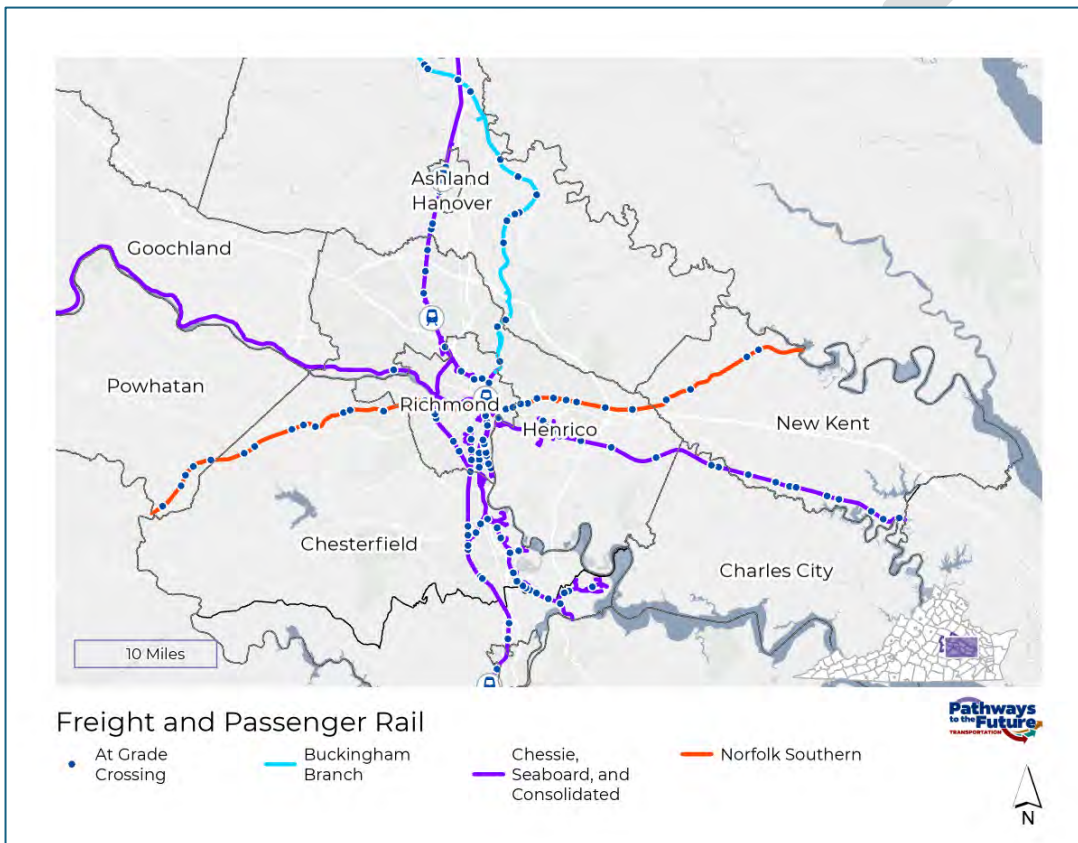


Exhibit 6. Rail Lines

Richmond Region Passenger Rail Stations

Staples Mill Station: Staples Mill is the busiest station by ridership in the Southeast. 2024 Ridership: 461,204.

Main Street Station: Located downtown, this station offers convenient access to the city center. 2024 Ridership: 128,341.

Ashland Station: Serves Downtown Ashland. 2024 Ridership: 39,109.

Ettrick/Petersburg Station: This station in southern Chesterfield also serves Petersburg and Colonial Heights. 2024 Ridership: 55,835.

Active Transportation

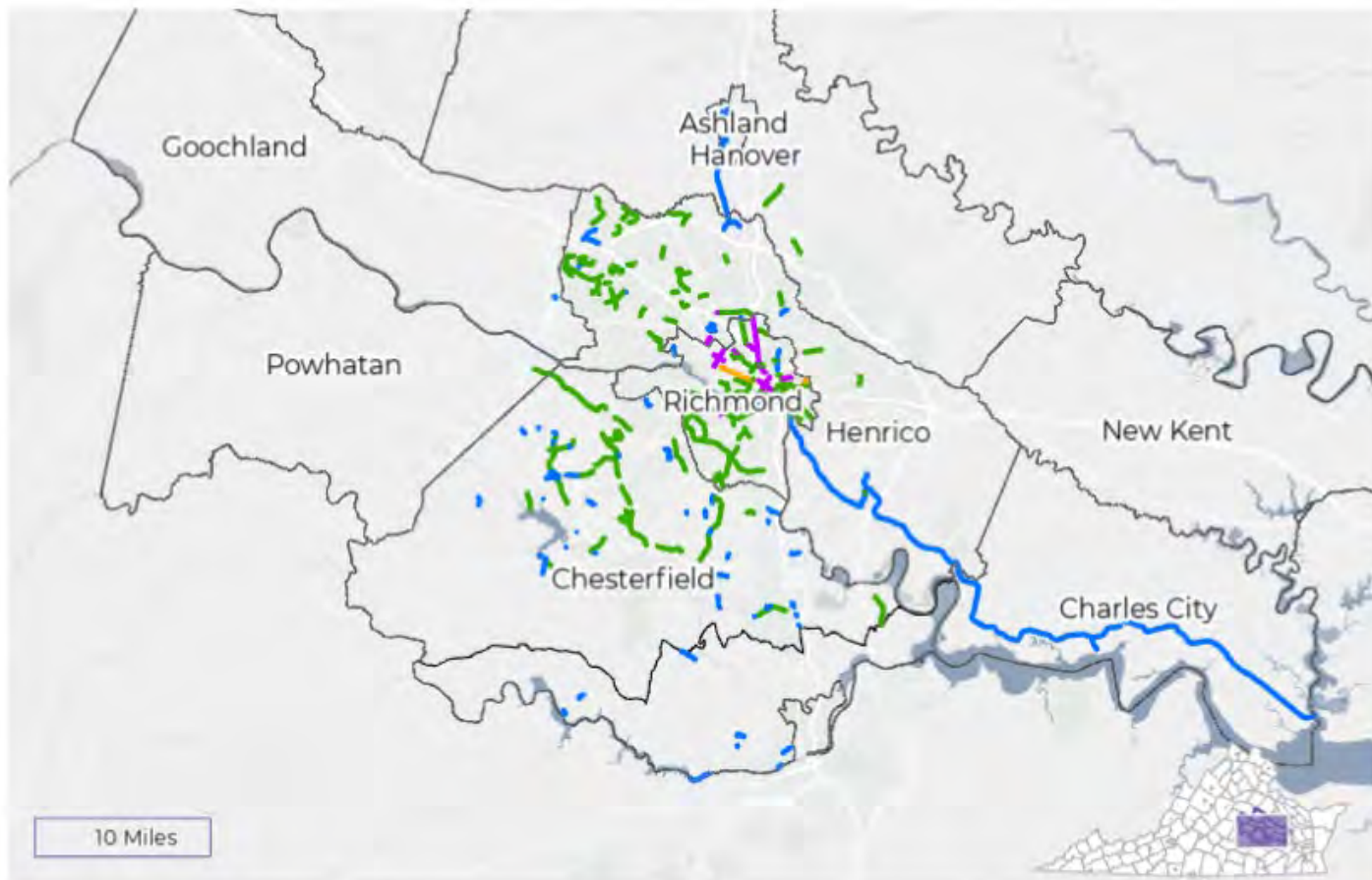
Active transportation is described as human-powered mobility, such as biking or walking and requires a dedicated multimodal network to ensure people can travel safely and efficiently.

Multiple types of facilities can accommodate bike and pedestrian travel. [PlanRVA's BikePedRVA 2045 Bicycle and Pedestrian Plan](#) details the definitions of bicycle infrastructure throughout the region, including: bike lanes, shared use paths, cycle tracks (also called protected bike lanes), and mixed traffic facilities. These types of bike infrastructure differ in how they are integrated into the roadway or landscape. There are almost 190 miles of bicycle infrastructure in the region, with significant increases in the mileage of facilities over the past five years (Exhibit 7).

There are many types of projects that can add to the active transportation network and/or make the network safer for users. In keeping with VDOT frameworks and locality plans and policies, many localities use Complete Streets approaches to incorporate active transportation as part of new infrastructure or projects such as road widening. In addition, some localities have used roadway reconfiguration, or “road diets,” which generally involve removing one or more travel lanes from a roadway and utilizing the space for other uses or travel modes, to expand the mileage of active transportation facilities. Projects such as adding refuge islands or ramps can improve user safety.

The BikePedRVA 2045 Bicycle and Pedestrian Plan draws upon locality Comprehensive Plans, Recreation Master Plans and other local and regional planning documents to plan for a growing active transportation network. This plan includes a set of “spine” and “spur” trails; the spine trails are the north-south and east-west routes that anchor the network, and the spur trails connect activity centers and spines within the region. The Virginia Capital Trail, a 52-mile multiuse path connecting Richmond and Jamestown, opened in October 2015, and represents the beginning of the east-west spine. The Fall Line Trail will serve as the north-south spine, connecting the Town of Ashland to Petersburg along a 43-mile corridor generally following U.S. Route 1. The spines and spur trails are now also coordinated with a network of existing greenway trails and opportunity greenway alignments shown in the Regional Natural Resources Plan. BikePedRVA 2045 also has a set of guiding principles, which include making last-mile transit access a priority, focusing on multimodal safety, and connecting historically disregarded communities to employment and services.

**GOAL A: SAFETY,
GOAL B:
SUSTAINABILITY,
AND C: RELIABILITY
ALL INCLUDE
ACTIVE
TRANSPORTATION
OBJECTIVES.**



Existing Regional Bike Networks

- Bike Lane
- Cycle Track
- Mixed Traffic Facility
- Natural Surface Trail
- Shared Use Path



Exhibit 7: Existing Regional Bike Network

Freight and Intermodal

The Richmond region boasts a robust freight infrastructure, integrating warehouses, freight rail, airports, and marine terminals to facilitate efficient goods movement. Collectively, these facilities and services position the Richmond region as a strategic hub for freight transportation, offering comprehensive solutions that support both domestic and international trade.

Trucking

Whether measured by weight or value, most freight in the region travels by truck. Truck traffic is concentrated on certain roadways in the region, which are designated components of the National Highway Freight Network (NHFN), a vital part of the country's transportation infrastructure designed to improve the efficiency, reliability, and safety of freight movement. The NHFN in the region includes I-95, I-295, and I-64 which all act as critical freight gateways. Interstate 95 carries much of the region's share of truck traffic. On average, approximately 18,000 trucks travel on interstate 95 with daily truck traffic volumes reaching as high as over 21,000 in specific road segments in 2023. A wide variety of commodities are shipped by truck to and from the region, with some of the highest volumes and most valuable products including nonmetal mineral products, gravel, logs and wood products, tobacco products, electronics, machinery, rubber/plastic, and motorized vehicles.

Rail

The freight rail system is integral to the region's logistics network, with major railroads providing extensive service to and from the area. The Richmond area has been served by multiple railroads for nearly 200 years. Railroads are designated as Class I, II, or III according to their annual revenue. There are three rail entities that own and maintain tracks in the region: Class I CSX Corporation (CSX) and Norfolk Southern Corporation, and Class III Buckingham Branch Railroad. Together, the region's freight rail system accounts for approximately 300 miles of track. Two main rail hubs in the Richmond Region are maintained by CSX: Acca Yard and Fulton Yard. Acca Yard is the primary facility, located at the junction of the two north-south CSX mainlines. Acca Yard has about 20 tracks and provides various freight services for north-south and east-west lines, such as crew switching, staging, bulk transfer, and rail car maintenance. Fulton Yard has surplus freight storage capacity. The 13-track yard is primarily used for staging and train switching but also has capacity for bulk transfer and industrial switching.

**GOAL B:
SUSTAINABILITY
INCLUDES FREIGHT
AND INTERMODAL,
RECOGNIZING THE
ROLE OF PLANNING
FOR FREIGHT
MOVEMENT IN A
CLEANER
TRANSPORTATION
SYSTEM FOR THE
FUTURE. MEETING
THE OTHER THREE
GOALS WILL ALSO
INVOLVE PLANNING
AND IMPROVEMENTS
THAT ACCOUNT FOR,
AND WILL BENEFIT,
FREIGHT AND
INTERMODAL.**

The region's freight rail lines transport approximately seven percent (7%) of the tonnage and two percent (2%) of total value that passes to, from, and within the Richmond Region. Coal, basic chemicals (such as biofuels, edible and base oils), waste/scrap, and cereal grains were the top commodities entering the Region via rail in 2023 by tonnage. The Department of Rail and Public Transit's Rail Industrial Access Program help local businesses improve their connection to both regional and national freight networks. This is particularly important for industries in the area, such as agriculture, manufacturing, and distribution, which rely on rail to transport bulk materials efficiently. In addition to continuing maintenance of the existing railroad bed and supporting structures such as bridges, there are several railway corridors and other rail facility needs that have been identified in the region. Virginia is implementing a series of rail infrastructure improvement projects between Richmond and Washington, DC, to expand and enhance passenger rail and freight operations in Virginia. Additionally, a new Richmond Layover Facility is needed to support existing and future passenger rail service, eliminate non-service trips to Staples Mill Station, and reduce rail congestion and encounters with freight operations.

Continued safety improvements are another need, particularly in relation to the interaction of rail and other transportation modes. In 2022, the Virginia Department of Transportation, in conjunction with the Virginia Department of Rail and Public Transit, published the Virginia Grade Crossing Action Plan which seeks to provide strategies and actions that will improve rail service, with a particular focus on rail-highway grade crossings. The Richmond Region has an estimated 179 at-grade rail crossings, and these locations can be dangerous for both highway and rail users. The region saw forty-seven highway rail incidents between 2018 and 2023, with most being in Richmond (seventeen) and Chesterfield County (thirteen).

Port

Richmond Marine Terminal (RMT), operated by the Port of Virginia (POV), serves as a pivotal multi-modal freight and distribution hub on the James River, connecting waterborne, rail, and truck shippers throughout the mid-Atlantic states. Adjacent to I-95, this 121-acre port features direct rail access, container-on-barge service to Hampton Roads, and 300,000 square feet of on-site warehouse space, with additional facilities in the surrounding commercial areas. Through the Port of Virginia, RMT has direct access to over 80 ports, a 24-hour drop-off facility for trucks, and distribution and warehouse facilities. Intermodal access to RMT includes barge, roadway, and rail. RMT's barge service also benefits the region by providing a maritime alternative to I-64 for transporting goods via the James River, thus significantly cutting down on trucking imports bound for regional distribution. In 2023, the barge service kept 33,500 trucks off the road — saving 3.4M truck miles on Virginia's highways, with sixty percent less carbon emissions compared to moving freight by truck. The Port of Virginia's Gateway Investment Program outlines major capital improvements, with a \$1.4 billion investment aimed at expanding and modernizing its facilities. The 2019 Commerce Road Corridor Study contains recommendations to enhance safety and improve access to the Port and the surrounding area and has led to several improvement projects and further targeted studies.

Air Travel

Richmond International Airport (RIC) is the region's largest airport, providing scheduled commercial airline service and major air cargo operations. Approximately 2.4 million passengers boarded flights at RIC in 2023, making it a key part of the region's transportation system and playing a major economic role enabling travel to and from the region for both business and recreation. RIC is accessible by personal vehicle, taxi and rideshare services, and from some parts of the region, via GRTC high frequency bus. In addition to its passenger traffic, (RIC) is a significant air cargo facility, handling over 115 million pounds of cargo annually. RIC's cargo facilities encompass 750,000 square feet of cargo apron and 142,000 square feet of air cargo warehouse space with direct apron access. Its central Mid-Atlantic location enables goods shipped from the metropolitan Richmond area to reach 50% of the U.S. population within 24 hours, enhancing manufacturing efficiency and reducing costs for area companies. Intermodal access to RIC includes roadway and rail. In the last twenty years, significant investments in roadway infrastructure, including Pocahontas Parkway and the Richmond Airport Connector, have improved access to RIC for both travelers and freight. In addition, a Class I freight railroad abuts the airport. This rail and right-of-way, owned and operated by CSX Transportation, are located along the southern airport boundary. The Richmond Region is also served by Chesterfield County Airport, Hanover County Municipal Airport, and New Kent County Airport.

Regional Context

Population and Demographics

Approximately 1.1 million people of many backgrounds, ages, and abilities live in a region spanning roughly 2,165 square miles across nine jurisdictions. The region’s population has grown substantially over recent decades from 547,542 to 1,120,304 people, or by about 105%. In line with trends across the state, the rate of growth has slowed over the last decade. The counties of Henrico and Chesterfield have grown the most in absolute terms, while the percent increases in growth on the edges of the Region have been significant. Richmond’s population declined from the 1970’s through 2000, but between 2000 and 2010 increased, a trend that accelerated between 2010 and 2020. State and regional agencies project continued population growth between now and 2050, although the rate of growth is projected to continue to be lower than in past decades. The region is projected to add about 30% more people during this time, climbing above 1,400,000.

Some segments of our population need particular consideration when planning for our current and future transportation system, such as the population groups listed below.

Population Group	Regional Percentage (2022)
Limited English Proficiency	2.63%
Foreign Born	8.98%
Minority	43.16%
Low Income	9.48%
Individuals with Disabilities	12.51%
Zero Car Households	6.80%
Elderly	13.90%
Female Headed Households	13.68%
Cost Burdened Households	13.73%

LAND USE AND TRANSPORTATION DECISIONS IMPACT TRAVEL DISTANCES, TRAVEL MODE CHOICE, AND SHAPE THE ACCESSIBILITY OF EMPLOYMENT, GOODS, AND SERVICES. LAND USE AND TRANSPORTATION DECISIONS ALSO HAVE SIGNIFICANT EFFECTS ON THE ENVIRONMENT, PUBLIC HEALTH, COMMUNITY CHARACTER, AND ECONOMIC VITALITY. ALL OF THE ELEMENTS IN THIS REGIONAL CONTEXT SECTION RELATE TO EACH OF THE PLAN’S GOALS (SAFETY, SUSTAINABILITY, RELIABILITY AND RESILIENCE).

Households and Housing

Between 2017 and 2022, the region's housing stock has grown by about 20,000 units, increasing from about 450,000 units in 2017 to about 470,470 units in 2022. As the region continues to add people, the resulting increase in housing demand will drive residential and household growth through 2050, when about 614,000 units are projected. According to the ACS 5-Year 2020-2024, two-person households are the most prevalent type of household in the region (30%), followed by households with four or more people (27%), and one-person households (26%). Seventy percent of the region's housing units are single-family (51% detached, 20% attached), and 30% are multifamily. About 60% of the larger region (which includes the Tri-Cities) are homeowners, with New Kent and Powhatan having the highest percentages. Significantly larger proportions of Richmond and Henrico residents are renters than residents in the rest of the region.

Housing and transportation costs typically make up the largest portions of the cost of living for Americans. Increased housing prices in the region in recent years have negatively affected the ability of existing residents to afford housing, particularly lower income residents. This issue can be seen in housing cost burden data, which looks at households where monthly housing costs (including utilities other than telephone) exceed 30% of monthly income. Recent data shows that almost 20% of the region's homeowner households, and around 45% of the region's renters, were housing cost-burdened (source: ACS 5-Year 2017-2021, data includes the Richmond region and the Tri-Cities). The [Greater Richmond 2026 Regional Market Value Analysis](#) shows that very limited portions of the region are affordable to households earning below 100% of Area Median Income (AMI). Residents of the Richmond region may find more affordable housing options further from the urban core but can face increased gas costs/overall transportation costs and narrowed employment options. On the other hand, extending transit and planning for increased development density can lead to increased land and housing values, which could cause displacement of existing residents. Proactively working to include affordable housing and pursue anti-displacement approaches in transportation opportunity-rich neighborhoods and activity centers can make the overall cost of living lower, among other benefits. Careful consideration and alignment of housing and transportation policy can help to address these types of issues.

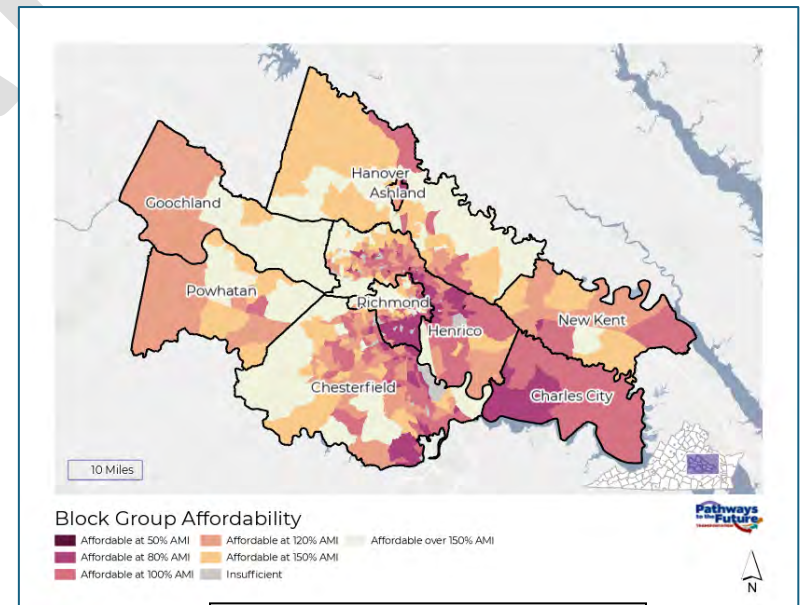


Exhibit 8: Housing Affordability

Employment and Income

The Richmond region's transportation system is critical for the functioning of the region's economy across all sectors, enabling people to travel to places of employment and to obtain goods and services, and enabling goods produced here to reach destinations within the region or to start their journey across the country or world. The positive attributes of our transportation system, from relatively low congestion levels to increasing number of options (transit and active transportation, etc.), also help to attract people looking for a region with a high quality of life, which in turn helps attract employment to the region. Economic development activity in established employment centers and expansion into new centers in the region both have benefited from, and have driven, investments in improved transportation infrastructure.

The Richmond region has a diverse economic base, including state government agencies, corporate offices, higher education institutions, health care, and advanced manufacturing. The largest sector in the region is Health Care and Social Assistance, followed by Retail Trade and Educational Services. Compared to the national average, the region has high concentrations of employment in Management of Companies and Enterprises, Finance and Insurance, and Arts, Entertainment, and Recreation. Between 2017 and 2050, employment in the region is projected to add approximately 166,200 workers, an increase of about 30 percent.

The region has many positive economic indicators, including levels of labor force participation, unemployment, per capita income and poverty rates that are better than state and/or national averages. However, income disparities remain significant; the median household incomes in New Kent and Goochland are almost double the median household income in Richmond, and there are some areas with high percentages of the population living in poverty.

Each day hundreds of thousands of people in the Richmond region rely on the transportation system to travel to and from their place of employment. Within the region, localities with more employment centers draw higher shares of these workers and have higher levels of in-commuting, while some localities are more residential in nature with less employment.

Most commuters in the region travel to work by driving alone, with remote work and carpooling the next most common options. Most commutes take between 10-30 minutes, with a mean commute time of 28.45 minutes; however, commute time varies significantly by locality.

	Drives Alone	Carpool	Public	Walk	Bike	Taxi, Motorcycle, other	Remote	Total Workforce
Charles City	2,666	209	57	14	-	77	241	3,290
Chesterfield	148,397	17,811	438	1,192	184	1792	25,698	190,098
Goochland	8,866	551	-	85	-	41	1,897	11,470
Hanover	44,997	3,254	73	670	16	484	8,173	58,039
Henrico	130,212	13,761	1,156	1,231	231	2136	30,837	181,506
New Kent	9,253	779	25	47	-	106	2,163	12,381
Powhatan	11,998	830	18	77	-	45	2,388	15,453
Richmond	81,702	10,894	5,043	5,256	2,009	1829	17,093	124,714
Region (%)	73%	8%	1%	1%	0%	1%	15%	596,951

Source: 2022 ACS

	Under 10 min.	10 to 30 min.	30-60 min.	60-90 min	Over 90 min.
Charles City	218	674	1,808	180	101
Chesterfield	11,172	84,958	56,092	3,796	3,044
Goochland	831	3,876	4,095	437	190
Hanover	4,209	26,377	15,606	1,169	1,400
Henrico	15,177	91,803	30,293	3,016	2,780
New Kent	464	3,586	5,328	361	181
Powhatan	573	4,423	6,617	842	304
Richmond	11,845	65,517	20,654	2,995	1,654
Region	44,489	281,214	140,493	12,796	9,654
Overall Percent	9%	58%	29%	3%	2%

Source: 2022 ACS

Travel and Tourism

The Richmond region offers a rich blend of history, culture, outdoor activities, and unique local experiences. From historical landmarks such as the Virginia State Capitol and the Civil War Museum to cultural attractions, such as the Virginia Museum of Fine Arts and the Altria Theater, the region offers a plethora of leisure opportunities for all visitors. The region hosted 17.9 million visitors in 2023 who spent approximately \$4 Billion, according to the Richmond Region Tourism's FY 2023–2024 Annual Report.

Tourism plays a significant role in the economic development of the region through job creation, infrastructure development, and tax revenue. The growth of tourism often drives the development and expansion of transportation infrastructure, and in turn, improvements in transportation systems can make destinations more accessible, thus boosting tourism. To facilitate a comprehensive, cooperative, and continuing planning process, economic development and tourism agencies should work with state, county and city agencies and departments to ensure that visitors' multimodal transportation needs are considered and addressed in broader transportation strategies and plans.

[Richmond Region 2030](#), the region's foremost tourism plan, takes a strategic approach to defining an overarching vision and competitive positioning for the region as a tourist destination. The plan makes several reference points to the importance of strategic transportation planning to the regional tourism industry, including helping to identify options that leverage existing transportation solutions, advocating for a visitor transportation strategy for the Richmond Region that encourages multimodal transportation options, and conducting visitor studies that predict future demand to be used in transportation policies.

Land Use and Development Patterns

The region's geography includes a full spectrum of development types (Exhibit 9). The center of the region is the city of Richmond's central business district and other urban areas in Richmond, Henrico and Chesterfield. Surrounding this core are a variety of major activity centers, suburban communities, the town of Ashland, rural villages, and forested and farmed land. The different development typologies influence the mobility options that are available. Land use and transportation decisions impact travel distances, travel mode choice, and shape the accessibility of employment, goods, and services. Land use and transportation decisions also have significant effects on the environment, public health, community character, and economic vitality.

Previous sections of this chapter provided information about projected increases in 2050 population, housing units and jobs. These projections are based on work that is documented in *Technical Report A: Socioeconomic Data Report* and represent a baseline or “trendline growth” assumption about the future. However, given that the future is uncertain, the Pathways to the Future Scenario Planning process documented in *Technical Report E: Scenario Planning Process* also modeled the region's future with different amounts and patterns of future growth, grounded in both existing land use and possible future land use patterns derived from locality policies and planning documents.

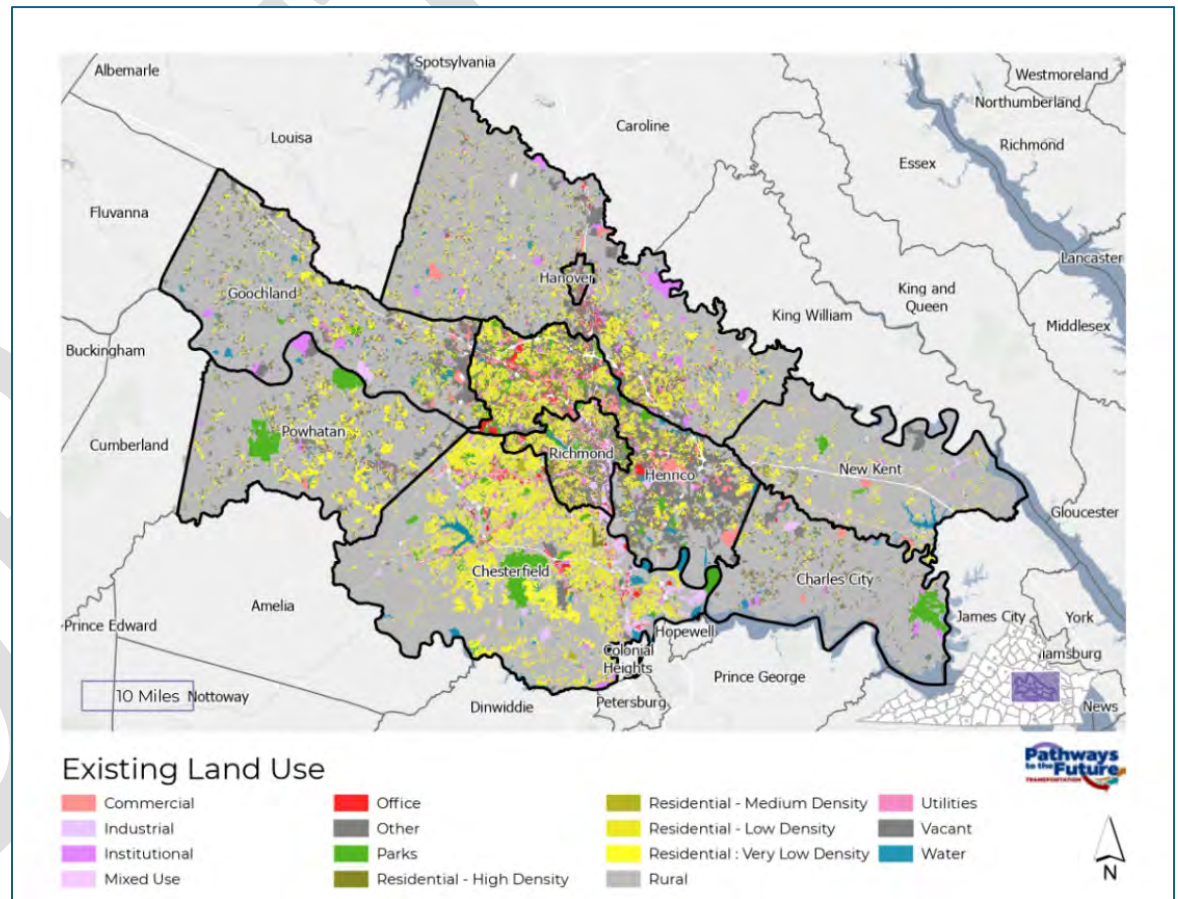


Exhibit 9: Existing Land Use

Environment and Resilience

Natural Resources

Identifying the location of environmental resources and avoiding or otherwise accounting for their presence can help preserve unique habitats and cultural heritage sites, retain ecosystem function and services, help meet local, state and federal water quality goals, and reduce risks to the infrastructure from natural hazards. In addition, recognizing environmental features during the planning phase can guide the location or design of transportation projects, potentially reducing delays and costs during the project implementation phase when the project must demonstrate compliance with state and federal environmental and historic preservation laws. Some of the region's key environmental features and preserved lands are shown on the map and described below.

Wetlands are areas where water covers the soil, providing essential functions like water quality improvement, flood mitigation, and shoreline protection. Ecological cores are large natural land patches that form a network for Virginia's ecosystems, while wildlife corridors connect these cores, helping animals and plants move between habitats, crucial for biodiversity conservation. Conserved lands and conservation easements are protected for natural resource, recreation, or cultural heritage reasons.

Over the years, these landscape features, along with other important natural and cultural heritage resources, have been documented in regional Green Infrastructure and Natural Resource Plans. In addition, the Regional Ecosystem Framework tool aggregates and indexes environmental and cultural features to help screen, guide and prioritize transportation projects, and to determine the best transportation network solutions and opportunities.

**GOAL B:
SUSTAINABILITY
RECOGNIZES
NATURAL
RESOURCE
PROTECTION
NEEDS.**

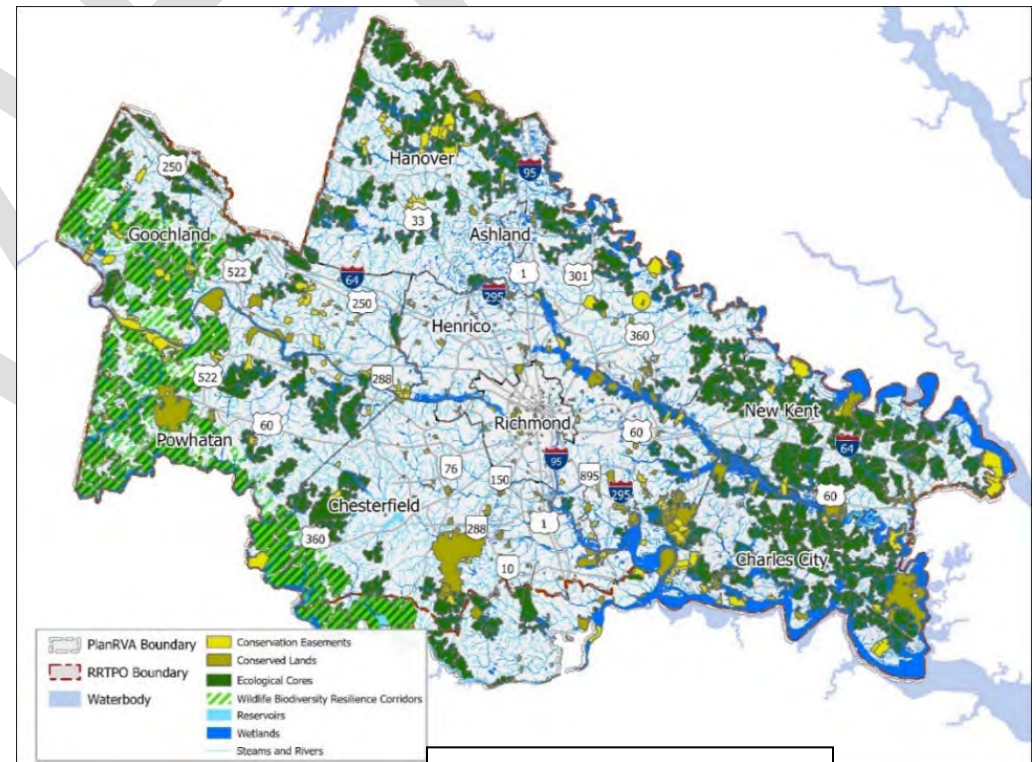


Exhibit 10: Natural Resources

Natural Hazards Resiliency

The high costs and long-term nature of transportation network infrastructure improvements require consideration of risks to the network from various natural hazards. The Richmond-Crater Hazard Mitigation Plan (HMP), adopted in 2022, is a multi-region plan that presents information about natural hazards risks from a regional standpoint, based on both datasets and local knowledge and experience. The Richmond-Crater HMP lists six critical hazards with moderate or high risk for the region: flooding, severe wind events, tornadoes, severe winter weather, droughts and extreme heat, and thunderstorms. Assessments of the region's natural hazard frequency and economic impact have primarily focused on trends based on past patterns of hazard occurrence and amount of damage caused; as the climate changes, some hazards, such as heavy rainfall events, flooding, and extreme heat, are projected to increase in frequency and severity.

**GOAL D: RESILIENCY
FOCUSES ON THE NEED
FOR A TRANSPORTATION
SYSTEM THAT IS
PREPARED FOR NATURAL
DISASTERS, EXTREME
WEATHER EVENTS, AND
OTHER EMERGENCIES.**

Whether through direct damage or through operational issues creating unsafe conditions, disruptions to the transportation network can have significant implications. Disruptions to the network can endanger human health and safety, isolate communities, and delay emergencies and recovery efforts. Disruptions can also affect normal movement of people and goods, including access to schools and activities, daily commuting, provision of essential services, and other economic activities, leading to community hardship and economic loss. Investments to make the region more resilient can help minimize potential future impacts on transportation infrastructure and disruptions to services and operations. A transportation system resilient to natural hazards is one that offers a range of mobility options and has infrastructure that can withstand, respond to, and recover rapidly from weather-related impacts while continuing to serve the needs of people traveling in and through the region.

System Security

There are many types of events that could significantly impact the transportation system and its ability to provide movement of people and goods within the region. A 2018 Threat and Hazard Identification and Risk Assessment (THIRA) report for the region identified events or conditions that could have significant impacts, including cyberattacks, hazardous materials spills, terrorist attacks on transportation hubs, and incidents at the North Anna Power Station. It is important for local authorities to regularly conduct evacuation drills and keep the public well-informed about designated routes through maps, signage, and digital alerts that provide real-time updates.

Air Quality

As required in the Clean Air Act, the Environmental Protection Agency (EPA) must set limits on certain (criteria) pollutants that are harmful to public health and the environment. In the Clean Air Act, there are six “criteria” pollutants: ground level ozone, particulate matter, carbon monoxide, lead, sulfur dioxide, and nitrogen dioxide. These criteria pollutants are defined in the Clean Air Act as harmful to public health and the environment. These pollutants are related to transportation because some of them are caused by emissions from mobile sources.

GOAL C:
SUSTAINABILITY
INCLUDES AN OBJECTIVE
AND STRATEGIES TO
ADDRESS EMISSIONS.

The Clean Air Act mandates that transportation planning, including metropolitan transportation plans and improvement programs, must “conform” to the state’s air quality implementation plan, meaning transportation projects must be designed to not worsen air quality and must consider strategies to reduce emissions from vehicles to meet established air quality standards. While the Richmond region is considered in “attainment” for all current emissions standards, the Richmond area once was classified as a “non-attainment” area, and later a “maintenance area” for the 1997 eight-hour ozone standard. As a result of this “maintenance” status, the types of emissions included in the region’s air quality conformity analysis are volatile organic compounds (VOCs) and Nitrogen Oxide (NOx), which are building blocks for the formation of ozone gas. Additionally, fine Particulate Matter (PM_{2.5}), which are mixtures of solid particles and liquid droplets found in the air with diameters that are generally 2.5 micrometers and smaller, have historically been of some concern in the Richmond region.

The U.S. Air Quality Index (AQI) is EPA’s tool for communicating information about outdoor air quality and health. The AQI includes six color-coded (green, yellow, orange, red, purple and maroon) categories, each corresponding to a range of index values. The higher the AQI values, the greater the level of air pollution and the greater the health concern. In the Richmond region, the air quality has been very good since 2018, with one or fewer orange code days each year.

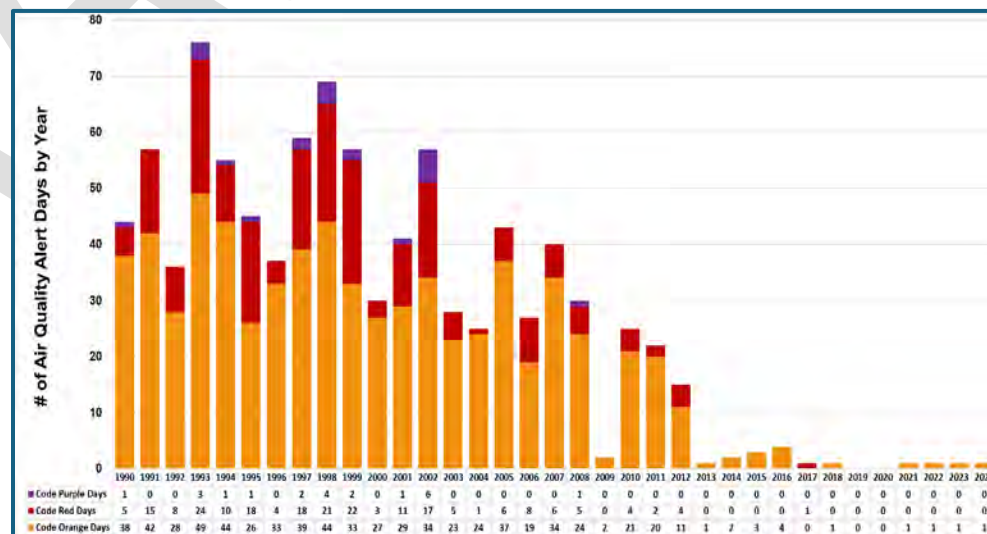


Exhibit 11: Air Quality Alert Days in Richmond (1990 - 2024)

Emerging Technologies

Autonomous Driving, Connected and Automated Vehicles (CAVs)

In 2025, Richmond, Virginia, continues to advance its engagement with autonomous vehicle (AV) technology through several strategic initiatives. The Virginia Department of Transportation (VDOT) oversees the development of Connected and Automated Vehicles, aiming to enhance transportation safety and efficiency statewide.

Richmond has completed phases I and II of its communication backbone projects, connecting 400 out of 477 signalized intersections to an Advanced Traffic Management System, with plans for phases III and IV to further expand this network. Additionally, the Virginia Innovation Partnership Corporation (VIPC) collaborates with various stakeholders to position Virginia as a leader in autonomous vehicle development, supporting research, technology commercialization, and educational opportunities in the field. These efforts underscore Richmond's commitment to integrating autonomous vehicle technologies into its transportation infrastructure, aiming to improve mobility and safety for its residents.

Alternative Fuel Vehicles

Hybrid and electric vehicles represent a cleaner transportation mode with fewer or no tailpipe emissions, making them an important consideration to make transportation in the region more resilient looking to the future. Nearly 70 models are on the market today, with vehicle types including hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (BEV).

As of 2022, there were 10,433 of these vehicles registered to owners in the region. The percentage is projected to increase through the early 2030s, then level out. Charging infrastructure is needed to serve electric vehicles. Recent data for the region showed 348 Level 2 ports across 160 locations and 163 Level 3 ports across 26 locations. Several different charging networks are present in the region, as well as some non-networked ports. Electric vehicle charging locations are found in many types of places, including homes, retail shops and municipal buildings. Key locations for future charging infrastructure include Park and Ride lots and commercial centers. Many localities in the region have taken steps toward supporting the use of EVs, such as adopting policies and actions to electrify municipal vehicle fleets and make EV charging stations more accessible.

Transportation Network Company/Shared Mobility

Ride-hailing services like Uber and Lyft have become prevalent throughout the U.S. A common feature of these services is the ability of the traveler to request a driver and vehicle through a smartphone app, and users are provided with real-time information about wait times. Ride-hailing services offer positive benefits to integrate multimodal transportation systems to serve all travelers and reduce vehicle miles traveled (VMT) and transportation emissions.

Micromobility

The term “micromobility” encompasses very light-weight vehicles such as e-scooters, bicycles, or electric assisted bicycles that carry a single person for short and first/last mile trips. Micromobility can increase access to transit and unlock more parts of the region for people who do not own cars. Micromobility can be human or electric powered, privately owned or shared, and most commonly operate at low to moderate speeds. Shared micromobility programs or services are provided to the public for a fee commonly using a smartphone app. In the Richmond Region, bike share programs are offered in the urbanized area and are provided by RVA Bike Share. Scooter sharing services operating in the region include Bird, SPIN, and Lime.

Chapter Four

Strategic Direction

Long Range Transportation Plan



2050

Chapter 4 – Strategic Direction

An essential purpose of the Long-Range Transportation Plan (LRTP) is to put forth a vision, guided by core principles and implemented by goals, objectives and strategies for the next 25 years of regional transportation improvements. The vision and other phases guide the development of the financially constrained list of projects which are expected to be completed by the 25-year time horizon, as further described in the next chapter.

Vision Development and Guiding Principles

The Vision describes regional transportation aspirations in a concise manner and provides a foundation for all other aspects of the plan. The Guiding Principles are a set of fundamental values and beliefs that provide a framework for the Vision. During development of *Transportation 2050*, the vision and guiding principles established in its predecessor plan, *ConnectRVA 2045*, were re-affirmed. Rather than formulating a new vision, there was a focus on maintaining the foundational elements across the cycles of LRTP updates. Minor revisions were made to the Vision and the Guiding Principles to ensure alignment with current federal transportation policy and priorities.

Development of the Goals, Objectives and Strategies

The following are the definitions for the Goals, Objectives, and Strategies used for *Transportation 2050*:

Goals	Where do we want to be?	Describe a series of desired end states for the region's transportation system informed by the vision – and provides a foundation for objectives and strategies.
Objectives	How do we measure success?	Describe specific, measurable statements that support the achievement of the goals.
Strategies	How will we get there?	High-level approaches/methods used to achieve the goals and objectives.

Building from the Vision and Guiding Principles, the Goals, Objectives and Strategies (GOS) were developed in accordance with Federal and State requirements, incorporating the ten Federal Planning Factors and the seven National Performance Goals (described in Chapter 1), and in recognition of this region's circumstances and issues (Chapter 3). The draft GOS were presented to the LRTP Advisory Work Group (AWG) for their review and input over the course of multiple meetings, which included smaller break-out group discussions. After numerous revisions, the LRTP-AWG recommended the draft GOS at its May 28, 2025, meeting.

The draft Goals, Objectives, and Strategies were made available for public review and comment from July 1, 2025, through July 15, 2025 through the project engagement page.

Goal A-Safe

CLOSED: This discussion has concluded.

Does this feel like the right goal? Are these some of the ways we can get there?

8

COMMENTS

8

PARTICIPANTS

482

VIEWS

Read and Contribute

Goal B-Clean

CLOSED: This discussion has concluded.

Does this feel like the right goal? Are these some of the activities that will accomplish it?

7

COMMENTS

7

PARTICIPANTS

403

VIEWS

Read and Contribute

Goal C-Consistent

CLOSED: This discussion has concluded.

Does this feel right? Are these the ways we might get there?

7

COMMENTS

7

PARTICIPANTS

435

VIEWS

Read and Contribute

Goal D-Prepared

CLOSED: This discussion has concluded.

Does this feel directionally sound? What is missing?

9

COMMENTS

7

PARTICIPANTS

414

VIEWS

Read and Contribute



The Policy Board adopted the Vision, Guiding Principles, Goals, Objectives and Strategies on August 7, 2025.

Vision and Guiding Principles

Vision

The transportation system in the Richmond Region will reliably and safely connect people, provide opportunities for all to thrive and live healthy lives, promote a strong economy, and respect conservation of natural resources.

Guiding Principles

GPI. Provide a safe system for all users by using proven strategies in planning, design, operations and maintenance as well as advances in technology to eliminate fatal and serious injury crashes.

GP2. Offer choice among all travel modes regionwide.

GP3. Expand the regional bicycle and pedestrian networks to provide active travel alternatives to driving, for better individual and community health.

GP4. Develop a robust transit network which delivers comprehensive, effective, and convenient service, particularly in areas of greatest need and to key destinations.

GP5. Ensure fairness in all transportation spending and planning decisions in the region with a focus on transportation in under-resourced communities.

GP6. Provide for the efficient, reliable and resilient movement of people and goods across the transportation network.

GP7. Align transportation investments and planning with land use, conservation of natural resources and community health.

Goals, Objectives and Strategies

Goal A Safety: A transportation system where no one is killed or seriously injured, and people feel secure and comfortable regardless of how they travel.

Objectives
A1. By 2050, the number of people killed or seriously injured on all roadways will be reduced by 100%.
A2. By 2050, the rate (per 100 million VMT) of people killed or seriously injured on our roadways will be reduced by 100%.
A3. By 2050, the number of people killed or seriously injured while biking and walking on our roadways will be reduced by 100%.

Strategies
AS1. Implement complete street policies including adding sidewalks and crosswalks, and other proven measures that prioritize the safety and comfort of all users, including people walking, biking, riding the bus, and driving.
AS2. Support the deployment of new vehicle technologies that better protect people inside and outside of motor vehicles.
AS3. Promote awareness of the rules and responsibilities of the road and efforts to reduce dangerous behaviors.
AS4. Prioritize a systemic approach to safety investments to reduce the overall risk of the transportation system in a cost-effective manner.

Goal B Sustainability: A cleaner transportation system that provides choices and meets the needs of the current generation and provides the same opportunity for future generations.

Objectives
B1. By 2050 the percentage of volume of freight moved via intermodal transportation (rail or through the port) will increase by 50%.
B2. By 2050, the average jobs and weighted destinations per capita accessible within 30 minutes by all modes (driving, transit, biking, walking) at AM Peak Hour (6:30AM-8:30 AM) will increase by 15%.
B3. By 2050, the percentage of residents and jobs within one-half-mile radius of public transit lines will increase by 10%.
B4. By 2050, the total daily vehicle miles travelled, and the average number of vehicle miles travelled per person each year will be reduced by 10%.
B5. By 2050, transportation related emissions per capita per year will be reduced by 75%.

Strategies
BS1. Make active transportation the most convenient option for shorter trips through infrastructure that is safe, accessible and comfortable for users of all ages and abilities.
BS2. Make transit a desirable option for longer trips in the region and beyond with service that is frequent and reliable.
BS3. Prioritize highways, rail, and port improvements that address freight bottlenecks and delays to ensure efficient movement of goods.
BS4. Support the adoption of electric and other alternative fuel vehicles and the deployment of needed charging infrastructure.
BS5. Support upward economic mobility by improving workers' access to jobs through reliable multimodal transportation options.
BS6. Coordinate land use planning with transportation infrastructure capacity and planned investment.
BS7. Prioritize multimodal transportation infrastructure improvements in Regional Activity Centers and Local Development Centers.

Goal C Reliability: A consistent and predictable transportation experience for all people regardless of how they travel.

Objectives
C1. By 2050, peak-hour traffic delays (hours of delay) will be reduced by 10%.
C2. By 2050, the percentage of single-occupancy vehicles trips will be reduced by 10%.
C3. By 2050, the average annual daily transit ridership will increase by 75%.
C4. By 2050, the miles of dedicated infrastructure for biking and walking will increase by 25%.
CS. By 2050, the Bridge & Culvert Deck Area on the National Highway System classified as in 'Good' condition will increase to 10% and 'Poor' condition will be reduced to 0%.
C6. By 2050, the pavements on the National Highway System which are in good condition will increase to 70%.

Strategies
CS1. Deploy advanced intelligent transportation system (ITS) infrastructure to support a high level of accuracy in real-time travel information provided to the public and coordination across all modes of travel.
CS2. Expand dedicated infrastructure for transit and active transportation to provide reliable commutes across all modes of travel.
CS3. Encourage mode shifts, shared rides, telework, and other demand management approaches which reduce peak hour demand for highway usage.
CS4. Ensure adequate maintenance and repair of bridges and pavements to keep them in a state of good repair.

Goal D Resiliency: A transportation system that prepares, withstands, and recovers quickly from disruptions caused by natural disasters, extreme weather events, and other emergencies.

Objectives
D1. By 2050, 10% of the at-risk transportation infrastructure on the LRTP Network will be improved to withstand extreme weather events and natural disasters.
D2. By 2050, the redundant capacity of the Transportation Network in the PM Peak Period (4:30-6:30 PM) will be increased by 5%.
D3. By 2050, the overall average systemwide Transportation Network connectivity will be increased by 2%.
Strategies
DS1. Conduct comprehensive vulnerability assessments of the transportation system to identify critical infrastructure and high-risk areas. Ensure critical infrastructure and infrastructure in high-risk areas are located or designed to avoid or withstand identified hazards.
DS2. Develop Response Mechanism for different system disruptions.
DS3. When planning for diversion and detour routes, incorporate information related to weight-restricted bridges, and roads with substandard pavements and geometric features.
DS4. Invest in resilient materials and technologies for infrastructure construction and maintenance. When existing vulnerable infrastructure is damaged by extreme weather including extreme heat conditions, make the additional investment required to rebuild it to withstand similar events in the future.
DS5. Prioritize enhancement of transportation network connectivity and multimodal redundancy to ensure swift and reliable emergency responder access during and after destructive events.
DS6. Minimize construction of new infrastructure in flood-prone areas and avoid the disturbance of natural resources that help buffer communities from flooding and extreme weather.
DS7. Develop and enhance community engagement and communication strategies to educate the public and increase awareness about disruptions to the transportation

Using the Goals, Objectives and Strategies

The GOS listed above were used during the LRTP process for project scoring and assessing future transportation system performance and will guide other transportation planning and funding activities in the coming years.

As shown in the diagram to the right, the Goals, Objectives and Strategies built to the development of a set of Performance Measures (PMs). PMs are numerical data that help answer the question of how much a potential solution will help meet that GOS. The PMs were used to score the candidate projects in the Universe of Projects. The twelve PMs used to evaluate each proposed project's effectiveness can be seen on the example Project Scorecard in Chapter 6. Chapter 6 and the project evaluation

guidelines (see *Technical Report G: Project Prioritization Process Report*) include more technical details on how each project was evaluated against these performance measures. The project score helped to prioritize projects by time-band for funding consideration in the constrained project list. Chapter 7 describes how the set of projects contained in the constrained project list was then evaluated for overall system performance in 2050 using the Objectives.

The Vision, Guiding Principles, and the GOS are also intended to be used in transportation planning going forward beyond *Transportation 2050* adoption. Data that helps the region understand progress toward the Objectives can be tracked over time. The Strategies will help guide development of the RRTPO Unified Planning Work Program (UPWP) and approaches to on-going partner coordination.



Chapter Five

Transportation Options for the Future

Long Range Transportation Plan



Chapter 5 – Transportation Options

Planning for the future transportation system involves addressing both existing deficiencies and considering what facilities and services will be needed as the region grows and changes over time both in the near and long-term future. Chapter 3 describes our current transportation system and, at a high level, some issues and plans for future changes. This chapter provides information about how a detailed assessment of regional transportation issues and needs was developed, and how that process informed development of a set of possible projects (known as the “Universe of Projects”) to consider for regional investment.



Issues and Needs Assessment

A detailed assessment of regional transportation issues and needs was developed to identify gaps in the transportation network – to find the discrepancies between the current state of the transportation system and the desired, safe and interconnected transportation system.

The assessment was divided into two sections: transportation Issues and Transportation Needs.

- Transportation Issues are defined as overarching deficiencies facing the current regional multimodal transportation network. Issues include deficiencies in safety, congestion, accessibility, predictability, infrastructure condition, and resiliency.
- Transportation Needs are defined as the potential solutions to the overarching issues, including road capacity changes, interchange modifications, grade separations, new transit routes, road realignments, road extensions, new roads, active transportation improvements, multimodal solutions, port capital improvements, and additional park and rides.

The assessment of Issues and Needs was conducted for the different transportation modes, including roadway, active transportation, transit, and freight.

Why a Regional Issues and Needs Assessment?

Localities and transportation agencies (such as the Virginia Department of Transportation) routinely undertake or oversee studies that investigate transportation issues within their boundaries, for specific neighborhoods or areas of the community, or for certain modes or types of issue. Examples of these studies include long-range plans (like Comprehensive Plans), area studies, and corridor studies. In many instances, these studies include engagement with the community and stakeholders, and review by local officials or agency boards. This regional analysis does not replace these data and assessments; instead, it draws upon these sources and adds datasets that are consistent across the full geography of the region.

to just those Issues that
subset of the region's major
way Network (**see box**).

allowed visualization of
way "corridors," where
spread (e.g., safety
where there were multiple
e.g., both safety and
compiled in a draft set of
draft inventory
way corridor segments
ed. In addition, active
ues were mapped on
potential solutions to the
consolidated, corridor-
were listed as high-level
ons, such as road
were compiled based on
ne existing studies and

The process of mapping the Issues allowed visualization of longer stretches of roadway, or roadway “corridors,” where certain Issue categories were widespread (e.g., safety concerns at many locations) and where there were multiple categories of documented Issues (e.g., both safety and condition issues). This analysis was compiled in a draft set of maps illustrating the Issues and a draft inventory spreadsheet listing the regional roadway corridor segments where Issues were most concentrated. In addition, active transportation or railway-related Issues were mapped on separate networks. The Needs, or potential solutions to the Issues, were then compiled for this consolidated, corridor-level view of the Issues. The Needs were listed as high-level characterizations of potential solutions, such as road extension or new transit route. They were compiled based on information primarily drawn from the existing studies and plans that were analyzed.

The LRTP Road Network

The LRTP Road Network is a subset of the region's major roadways. Specifically, the LRTP Road Network consists of:

- National Highway System (NHS) National Importance
 - o Interstate
 - o Other Principal Arterials
 - o Minor Arterials (only applicable to road widening projects)
 - o Strategic Highway Network (STRAHNET) and STRAHNET Network Connectors
 - o Intermodal Connectors
- Virginia's Primary State Highways: Statewide and Regional Importance
 - o Connects Jurisdictions with each other and with Interstates
 - o Route Number Below 600

See LRTP Road Network Map in Chapter 3



The resulting draft Existing Multimodal Transportation Issues and Needs Inventory was reviewed by localities and stakeholder agencies and refined based on their feedback. The LRTP-AWG reviewed and approved the Inventory at its meeting on August 27, 2025. More information about this process and the full Existing Multimodal Transportation Issues and Needs Inventory list is included in *Technical Report F: Universe of Projects Development*.

As described in the next section, this compilation of Issues and Needs was developed to inform the consideration of what projects could address identified needs. Where project ideas have already been formulated in the past, the Inventory was used as a tool to screen and verify if that project continued to meet an identified Need. However, it is important to note that an identified issue does not necessarily translate into a transportation project. Issues can be addressed by different types of projects and strategies, including changes in policy tools or regulations. It is also important to note that there were many issues identified, including those identified by the public, that would not generate a proposed project eligible for inclusion in the Universe of Projects because the issue was not classified as regionally significant (see next section for details). As part of the LRTP process, localities and other government agencies on the LRTP-AWG received the full compilation of identified Issues, including the feedback submitted by the public. Smaller-scale issues (e.g., a gap in the sidewalk network or a minor intersection improvement) can be addressed by projects considered “local” (not regionally significant); localities or transportation agencies can still develop and undertake these types of projects even if they are not part of Universe of Projects – see chapter 6 for additional information.

Addressing Issues and Needs: Universe of Projects Development

The next step in the LRTP process was to identify transportation project-based solutions to address the categories of issues identified through the process described above. These project-based solutions are more defined and detailed proposals than the broad Need categories; a project should have a defined “from” and “to” location, an anticipated timeframe for which it will be phased for completion, and an anticipated project cost. This step in the process resulted in a streamlined inventory of multimodal transportation projects that could be considered regionally significant, known as the “Universe of Projects.”

The work and input of the Project Champions (**see box**) was essential to creating the list of projects. RRTPO staff and Project Champions looked to completed or ongoing regional and local transportation studies and plans that identified a solution to address a specific identified transportation issue. For example, projects were drawn from previous LRTPs; projects that had been submitted for funding through the SmartScale, CVTA or RRTPO programs but had not been funded; and other recent plans and studies. RRTPO staff and Project Champions reviewed these projects and also compiled other possible projects identified in locality Comprehensive Plans or other transportation planning documents. The resulting initial set of projects was screened to confirm that each project would address an Issue listed in the Existing Multimodal Transportation Issues and Needs Inventory.

To be considered for inclusion in *Transportation 2050*, all possible projects were also required to be “regionally significant”. Staff worked with the LRTP Advisory Committee to develop a commonly accepted set of Project Inclusion Guidelines, which were used to determine what was considered regionally significant and whether a project was “regional” in nature or categorized as a “local” project (**see box on next page**).

Project Champions for different types of projects were consulted throughout the process as follows:

- Town of Ashland - Projects within Town of Ashland
- Charles City County - Projects within Charles City County
- Chesterfield County - Projects within Chesterfield County
- Goochland County - Projects within Goochland County
- Hanover County - Projects within Hanover County
- Henrico County - Projects within Henrico County
- New Kent County - Projects within New Kent County
- Powhatan County - Projects within Powhatan County
- City of Richmond - Projects within City of Richmond
- RRTPO – Multijurisdictional Action Transportation Projects, Bridge Projects and Highway projects (other than Interstate) crossing jurisdictional boundary
- GRTC – Transit Projects
- VDOT – Interstate Projects
- DRPT/VPRA – Rail Projects
- Port of Virginia – RMT Projects
- RideFinders (or/and localities) – Travel Demand Management Projects

Project Inclusion Guidelines

Regional Projects

The following types of projects are regional and therefore should be included in *Transportation 2050 (in the list of Constrained Projects or the Vision List)*.

1. Roadway Projects

- Project on roadways on the LRTP Road Network
 - o Capacity Change (add/remove lane; change use of lane e.g. HOV or HOT lanes, bus only lanes)
 - o Realignment, extension, or relocation
 - o New interchange or interchange modification
 - o Overpass or underpass
 - o Major Intersection improvements (must have at least one leg on the LRTP Road Network and a cost of 10 million dollars or more)
 - o Spot safety or ITS improvements bundled at the corridor level on the LRTP Highway Network (10 million dollars or more)
 - o Active Transportation and/or Transit Infrastructure improvements at the Corridor level bundled with a roadway project on the LRTP Network (10 million dollars or more)
- New road or alignment which normally would be on the LRTP Road Network
- Capacity change and other improvements to the highways not on the LRTP Road Network but providing access to Interstate/Freeway interchanges as part of new interchange/interchange modification projects.

2. Bridge Projects (State of Good Repair)

- Replacement/major rehabilitation of National Bridge Inventory (NBI) structures on the LRTP Road Network with a Poor or Cusp Bridge Condition Rating

3. Transit Projects

- Fixed Route Projects
 - o New Bus Rapid Transit (BRT) Corridors
 - o Expansion of Existing BRT Corridors
 - o Light Rail Corridors
- Major Transit System Improvements
 - o New Transit Hubs/Centers
 - o Relocated Transit Hubs/Centers
 - o Significant upgrade to existing transit infrastructure (10 million dollars or more)
 - o Large Scale Fleet Expansion (10 million dollars or more)

Project Inclusion Guidelines, Continued

4. Transportation Demand Management (TDM) projects

- New Park & Ride lots with 100 spaces or more
- Park & Ride lot expansions to existing lots that require 100 or more new spaces.
- Large-scale initiatives that aim to reduce single-occupancy vehicle travel and promote the use of alternative modes on a regional level (10 million dollars or more)

5. Active Transportation Projects

- Regional Trail Networks
 - Development of multi-use trails that connect significant destinations across Richmond region.
 - Major extensions or enhancements to existing regional trails.
- Large-Scale Bicycle Infrastructure
 - Implementation of protected bike lanes that serve regional travel needs.
 - Construction of bicycle and pedestrian bridges or underpasses on the LRTP Road Network.

6. Freight and Passenger Rail Projects

- Capacity enhancements to rail corridors.
- Grade separations on the rail corridors to improve safety and traffic flow.
- Projects that provide new rail line access to Port of Virginia, airports, rail yards and industries
- New or relocated Passenger Rail Stations
- Improvement/Construction of roadways that function as intermodal connectors (that provide access to POV, RIC, Passenger Railway Stations, etc.) (10 million dollars or more)
- Port of Virginia Capital Improvement Projects (10 million dollars or more)

Programmatic & Local Projects

Projects that do not meet the Project Inclusion Guidelines above are considered Local or Programmatic projects. These projects do not need to be specifically included in this plan but can still be funded and move forward – see Chapter 6 for additional information.

Finally, RRTPO staff worked with the jurisdictional staff and the LRTP-AWG to refine the Universe of Projects to add projects or to remove duplicative, previously funded, or unsupported projects. The Universe of Projects list was approved by the LRTP-AWG on December 3, 2025. Following some further revisions to remove duplications and combine projects where necessary, the Universe of Projects list was finalized. The final Universe of Projects included 198 projects in six project categories—highways, bridges, transit, active transportation, Park and Ride, and rail. More information about this process and the full set of projects in the Universe of Projects are documented in *Technical Report E: Universe of Projects*.

The following table presents a brief overview of the Universe of Projects, separated into the six project categories:

Project Type	Total Cost By Type	Total Number of Projects by Type
Highway	\$ 6,617,261,123	140
Active Transportation	\$ 426,134,500	21
Transit	\$ 1,415,000,000	14
Bridge Rehabilitation	\$ 490,159,000	6
Travel Demand Management	\$ 53,097,134	8
Freight/Passenger Rail	\$ 335,500,000	9
	\$ 9,337,151,757	198



[View an Interactive Map of the Transportation 2050
Universe of Projects](#)

For a project to be included in *Transportation 2050*, the following essential requirements were considered important to be met:

- A. The project addresses an issue listed in the Regional and Local Transportation Issues Inventory.
- B. The project qualifies as a regional transportation project based on the criteria of the LRTP Project Inclusion Guidelines.
- C. The project must be within the RRTPO's Metropolitan Planning Area (MPA) Boundary.
- D. The project must have location details ('From' and 'To'), anticipated project costs and time frame for which it will be phased for completion. Complex projects like interchanges required conceptual sketches as well.
- E. The project must be endorsed by a Project Champion. The Project Champion is defined as the jurisdiction or agency that is the project applicant or sponsor.
- F. The project should be demonstrated to have the political will to proceed.

Chapter Six

2050 Financial and Project Plan

Long Range Transportation Plan

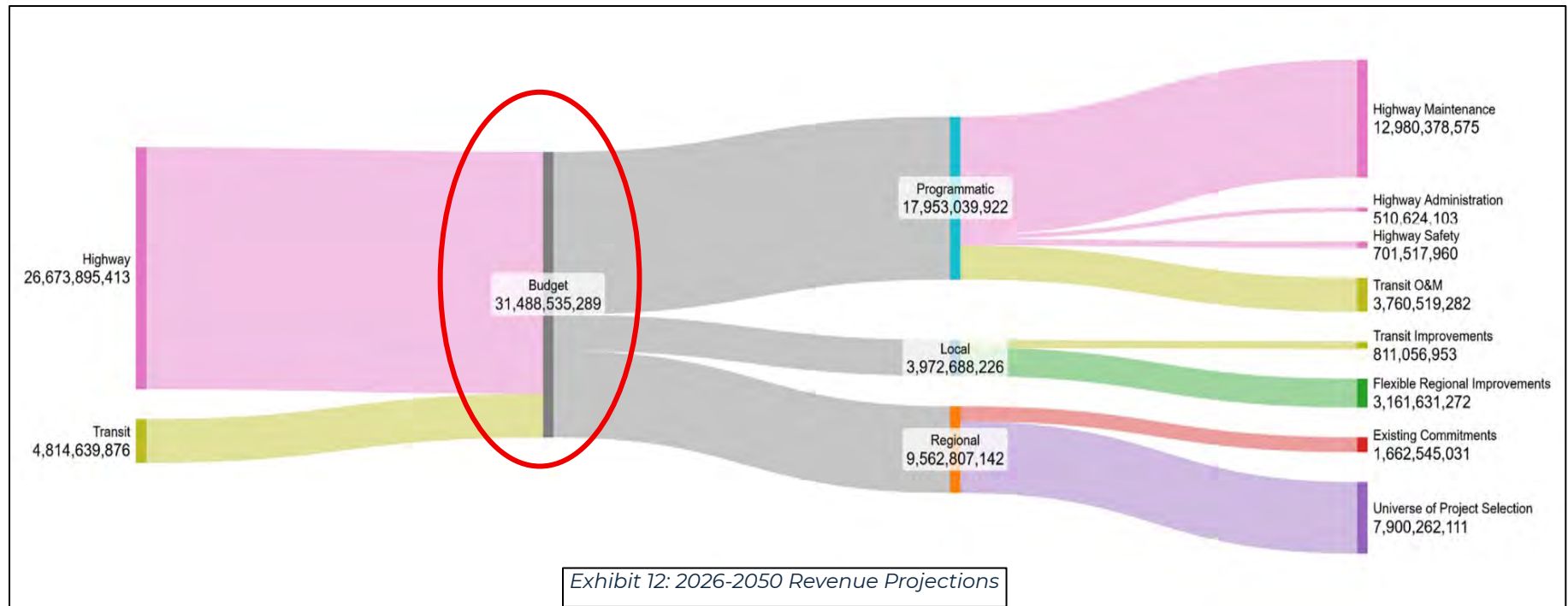


Chapter 6 – The 2050 Plan

The term “constraint” describes the process of demonstrating that the cost of planned investments is less than or equal to expected revenues. This demonstration requires the RRTPO to develop a financial plan that reflects expected revenues, and investments both to maintain the existing transportation system and to make proposed improvements to the system. The exhibit below summarizes the available revenues and planned investments in *Transportation 2050* and shows how the plan meets the financial constraints requirements. The following sections in this chapter provide more information regarding the components of this exhibit, with additional details in *Technical Report H: Constrained Plan Development Report*.

	Projected Revenues and Investments		
	Funded/No Regrets	Building Blocks	Priority Projects
	2026-2031	2032-2037	2038-3050
Total Projected Revenues Available	\$5,823,566,346	\$6,648,636,757	\$19,018,747,846
Projected Revenue	\$5,823,566,346	\$6,648,452,735	\$19,016,516,208
Carryover Surplus from Previous Period	\$-	\$184,022	\$2,231,637
Total Investments	\$5,823,382,324	\$6,646,405,120	\$19,018,052,542
Programmatic Investments	3,197,885,451	\$3,815,929,244	\$10,939,225,227
Local Investments	\$759,672,687	\$814,655,466	\$2,398,360,072
Regional Investments	\$1,865,824,185	\$2,015,820,410	\$5,680,467,243
Surplus	\$184,022	\$2,231,637	\$695,303

Projected Revenues



The RRTPO's revenue projections for the period covered by this plan (2026-2050, or 24 years) were developed cooperatively with VDOT, Virginia Department of Rail and Public Transportation (DRPT), and the Greater Richmond Transit Company (GRTC). Highway funding and most transit funding was projected by the relevant state agency and allocated to the RRTPO based on historic regional success in obtaining funding and population-share within the region. Projections of federal transit revenues beyond 2031 were developed by RRTPO staff using a 2.0 percent annual escalator based on historic growth in revenues and mirroring the assumptions used by VDOT for other federal revenues covered by this plan. A full breakdown of the assumptions can be found in *Technical Report H: Constrained Plan Development*. As shown in Exhibit 12, the total revenue projections for this period are about **\$31.5 billion dollars**.

Investment Areas

As shown in Exhibit 12, the estimated revenues are divided into three investment areas: programmatic, local, and regional projects.

- **Programmatic.** Programmatic investments are for the maintenance and operations of the regionwide transportation system. These investments are taken off the top and do not undergo a prioritization process as part of 2050 plan development. Most of the programmatic investments have a dedicated funding source which is not eligible for other uses. As with local capital investments, individual projects are generally not listed separately in the long-range transportation plan. Maintenance and operation of the existing transportation system, including systemic safety investments, are considered consistent with *Pathways to the Future: Transportation 2050*. Programmatic investments total approximately \$18 billion dollars and make up more than 57% of the planned investments through 2050.
- **Local.** Local investments are for generally smaller projects that serve only one jurisdiction, do not increase capacity on the regional network, and may include bus replacements, new sidewalks, or minor intersection improvements. This category also includes projects on local and rural minor collectors that are not generally eligible for federal funding. Local projects are not individually identified in the plan, but these projects are considered consistent with *Pathways to the Future: Transportation 2050* if they advance the vision and goals of the plan and are feasible within the local investments budget. Local investments total approximately \$4 billion and make up about 13% of the planned investments through 2050.
- **Regional.** Regional projects are those which add capacity to the regional transportation network or serve multiple jurisdictions. The project inclusion guidelines (see Chapter 5) identify the project types by mode (Highway, Bridge, Transit, Transportation Demand Management, Active Transportation) which are considered regionally significant. Projects in this category must be listed in the constrained plan to be consistent with *Pathways to the Future: Transportation 2050*. Regional investments total approximately **\$9.5 billion** and make up about 30% of the planned investments through 2050.

The *Transportation 2050* constrained financial plan first allocates funds for anticipated Programmatic and Local investments. The Regional Investments category funding allocation process is described in the remainder of this chapter.

Regional Project Scoring and Prioritization

As discussed above, the financial plan projects a total of about \$9.5 billion is available in the Regional category for regionally significant projects. Of this money, the first claim for these funds is projects that are already considered “Committed Projects.” Committed projects are those within the Richmond MPO which have funds allocated or planned for obligation within the FY26 - FY31 Six Year Improvement Plan (SYIP) or have unfunded balances after FY31 and meet the project inclusion guidelines for regional projects. The funding to complete these projects is pre-allocated before any additional Regional projects are considered for funding. This represents a commitment to finishing the projects we have already started. Given their status, *Transportation 2050* did not re-evaluate these projects and they are not included in the summaries of Regional projects below in this chapter. To view the Committed Regional projects, see the Constrained List of Projects found in Appendix D of *Technical Report H: Constrained Plan Development Report*.

Once the regional projects that already have committed funds have been accounted for, the available funds for additional Regional projects total approximately **\$7.9 billion**. Comparing the total funding that would be needed to pay for the full set of the Universe of Projects summarized in Chapter 5 to this figure for available revenues demonstrates that there is not enough funding to pay for all potential Regional projects, even without accounting for increased project costs over time due to inflation. For this reason, an important step in the plan process is assessing and prioritizing the projects in the Universe of Projects. This step helps inform the development of the final list of Regional projects that fit within the projected revenue, termed the Constrained List of Projects.

Committed Regional Projects

Committed Projects that meet the regionally-significant threshold have been included in past versions of the Long-Range Transportation Plan (LRTP) or were added through the formal LRTP amendment process over the years. The Committed Regional list of projects includes projects of all modes/project types. During the course of *Transportation 2050* development, several projects that had been in the Universe of Projects list received funding and inclusion in the TIP or SYIP and were therefore moved to the list of Committed projects. Examples include the North Gayton Road interchange in Henrico, the Meadowville Technology Parkway at I-295 in Chesterfield, and the Downtown and Northside Transfer Centers that GRTC is developing.

The funding to complete Committed projects is pre-allocated before any additional Regional projects are considered for funding. This represents a commitment to finishing the projects we have already started. Thus, *Transportation 2050* does not include these projects in the scoring or prioritization process.

How Does the Project Scoring Process Work?

As described in Chapter 5, for each mode, the LRTP process looked at a spectrum of possible issues and needs, then considered projects addressing one or more specific needs to arrive at the Universe of Projects. The project scoring process asks how well each potential project meets the overall Vision and set of regional Goals described in Chapter 4. This question is answered through calculation of Performance Measures (PM) for each Goal area.

The Performance Measures were used to score most projects in the Universe of Projects (see box below). The twelve PMs that were used to evaluate each project's benefits relative to the plan's Goals can be seen on the example Project Scorecard on the next page. All projects were given an overall score in the range of 0 – 100 for the expected benefit. Then, the project benefit was divided by the estimated project cost in tens of millions of dollars; all project estimates were initially provided in 2025 dollars and inflated based on the expected year of construction. The resulting benefit-cost score was used to guide funding consideration as described in the next section. An additional factor was a Project Readiness score assigned to each project to help inform which time band [near-(1), mid-(2), or long-term(3)] would be appropriate to consider for project funding. For more details on the project scoring methodology, see *Technical Report G: Project Prioritization Process Report*.

Project Scoring – Safety Example Component	
Goal: Safety	A transportation system where no one is killed or seriously injured, and people feel secure and comfortable regardless of how they travel.
Objectives	Listed in full in Chapter 4, these include reducing the number of people killed or seriously injured on our roadways, including those biking and walking.
Performance Measure Example	One of the Performance Measures is “Reduction in Fatal and Injury Crashes.”
How this Performance Measure is Calculated	A transportation model is used which allows transportation planners to measure the change in the annual expected number of fatal and injury crashes that can be attributed to a particular project. Based on the type of project, type and location of the applicable road, and past crash history, the model estimates the expected change in crash frequency and severity after implementing the project. For example, modifying an interchange to extend deceleration lane lengths, install lighting, or convert a diamond interchange to a diverging diamond interchange would all improve safety, but would have different anticipated crash reduction results which can be quantified.

Goal	Safety		Sustainability					Reliability			Resiliency	
Weight	25%		35%					25%			15%	
PM	F+I crash reduced	F+I crash rate	Access to Jobs	Access to Services	VTM per capita	Air Quality	Impact to Resources	Person thruput	Person hours of delay	Freight Corridor thruput	Redundant Capacity	Connectivity
Weight	70%	30%	30%	30%	20%	20%	*	40%	40%	20%	50%	50%
Points	17.5	7.5	10.5	10.5	7	7		10	10	5	7.5	7.5
Benefit Score	0 – 100 value											
Cost	###,###,###											
Cost Benefit Score	Benefit Score / (Cost / \$10,000,000)											

Note 1. In the Safety category, F and I stand for Fatalities and Injuries, respectively. In the Sustainability category, VMT stands for Vehicle Miles Traveled.

Note 2. In the Sustainability category, the Impact to Resources (natural and heritage landscape features) component was assessed after the other categories were scored.

Which Projects in the Universe of Projects are not part of the Project Scoring Process?

Major bridge rehabilitation and replacement projects were automatically included in the Constrained List, but are funded as Programmatic projects, paid for through the Programmatic funding allocation described above (State of Good Repair funding).

All Freight/Passenger rail projects were excluded from the constrained plan as rail revenue amounts are not provided at the MPO level. However, rail projects are included in the Vision List (*Technical Report H, Appendix E*) in recognition of the regional significance of certain large-scale rail projects planned in the region.

Constrained Regional Project List

Following project scoring, the next step fits the scored projects to the available funding (\$7.9 Billion). In doing this, a region can consider multiple approaches. Under Federal regulations, an MPO may voluntarily elect to develop multiple scenarios for consideration as part of the development of the metropolitan transportation plan. Historically, the RRTPO has developed a single constrained plan through a consensus approach working with the Advisory Work Group, which was then presented for feedback from the public and revision through the Work Group and Policy Board. For this plan, the RRTPO explored multiple revenue constrained investment scenarios. Each scenario reflected a different way of approaching project selection to help meet the regional goals. The four financial scenarios and the approach to their development are summarized below. A full description of the financial scenarios and a full breakdown of projects that were included in each scenario is included as Technical Report H: Constrained Plan Development Report, Appendix F. Each scenario reflected a different balance of investments across project types and modes:

A) Traditional Usage: Has a hard cap on the mode (e.g. highway, transit, bicycle) of the project within the package considering all measures - 70% highway and 30% transit/ rail/bike/sidewalk/park and ride. This is the usage the region has funded most recently.

B) Mode Shift: A break from existing investment patterns--increases potential investment in transit, rail, bike, sidewalk, and park and ride. Targets a funding split of approximately 55% for highways and 45% for all other modes. However, because some transit projects require large investments and cannot be partially funded, remaining funds that cannot fully cover those are used for highway, resulting in a final distribution closer to 60% highway and 40% other modes.

C) Transformative Benefit: Is the combination of solutions with the biggest impact toward meeting regional goals, regardless of mode. Is prioritized by benefit score and selected in priority order. This contains fewer projects because they are typically larger in scale and cost.

D) Cost Effective: Regardless of mode, the makeup is the most cost-effective combination. Is prioritized by their cost/benefit score and selected in priority order. This likely gives us the most "bang for our buck" and might contain more smaller, less costly projects, with some larger ones

All projects were evaluated in order of score. If a project could be included based on project type and remaining funds, it would be added. If not, the project was skipped. This process was completed for each scenario until remaining funds were insufficient to add additional projects.

Each of the four financial scenarios was shared with implementing project champions and the broader community for feedback on the preferred scenario and any recommended changes. The AWG then worked through development of a new consensus scenario which factored in this public input and the perspective of project champions. Staff facilitated a consensus building process to reach a compromise plan. This approach used a real time budget tool to move projects across time-bands and into and out of the plan. Factors considered in the discussion included which projects were included in both of the most-favored financial scenarios; a status change for several projects that had very recently received funding and inclusion in the TIP or SYIP and could now be considered Committed projects; data on each financial scenario package's system-level progress toward meeting plan Objectives in 2050; and local requests for project additions and removals. Through extensive discussions, the AWG settled on an approach that removed proposed highway widening projects which were not ready or likely to advance or major local priorities while adding a few active transportation and transit projects. Proposed time-bands were also revisited to better reflect project readiness and priority and address cost escalations. This approach was facilitated by the real time budget tool. The AWG reached a consensus and achieved a set of projects that fit within the available funding.

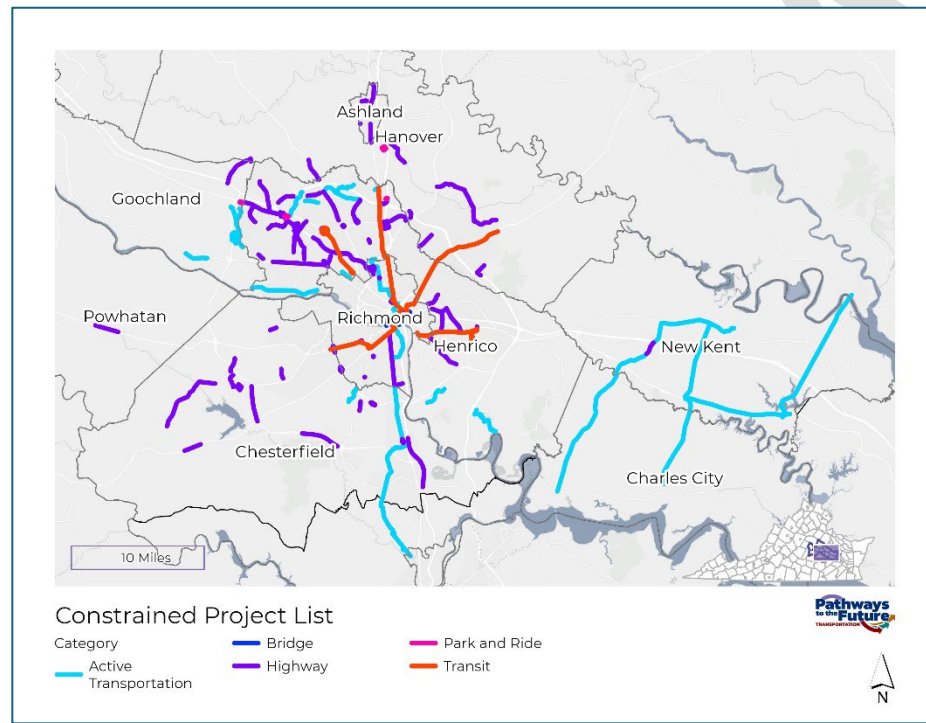
The final consensus package was a 70/30% split between highway and non-highway investments, while fully funding proposed active transportation needs, nearly 65% of transit needs, and more than 62% of park-and-ride needs, reflecting a diverse multimodal strategy.

As noted above, this set of Regional projects is one component of the overall Constrained Project List. Another major component is the set of already Committed projects. As the Regional projects were assigned to future funding time bands in the Constrained Project List, the Committed projects were all included in the initial time band (Time Band 1, 2026-2031). A small number of additional projects were cost-feasible in Time Band 1, while most other Regional projects were included in Time Band 2 (2032-2037), and Time Band 3 (2038-2050), depending on an assessment of the project readiness. The project list, broken out by time-band, is included in *Technical Report F: Constrained Plan Development Report*, Appendix D. The Constrained Project List also includes two final components: regionally significant Bridge replacement or rehabilitation projects (funded through Programmatic dollars), and a set of privately/locally funded projects that are included for informational and air quality conformity purposes.

The proposed Regional projects and Bridge investments join the already-funded Committed Regional projects as regionally-significant improvements to our transportation system, addressing a range of current deficiencies and future needs, within the parameters of available funding. The materials on pages 88-94 provide a summary of the *Transportation 2050* Regional projects and Bridge investments that make up the Constrained Project List (Committed Regional Projects are not included in these summaries).

- Exhibit 13 shows the Constrained Project List. To view an interactive version of the map, click the link below the fixed map. In the interactive map, you can click on specific projects to find out how a particular project was scored. This map will be updated over the years to show updates as projects are funded.
- Exhibit 14 summarizes the Regional Constrained Project List.
- The sections below provide a summary of these projects by mode or project type.

Exhibit 13: Constrained Regional Projects Map



[View an Interactive Map of the Transportation 2050 Constrained Project List](#)

Exhibit 14. Constrained Project List Summary

Transportation Mode	Project Type	# of Projects	Cost Estimate*
Highway	New interchanges/ interchange modifications	13	\$1,276,344,699
	Realignment, extension, or relocation	3	\$795,817,236
	Spot safety or ITS improvements bundled at the corridor level	9	\$478,898,954
	Active Transportation and/or Transit Infrastructure bundled with a Highway Project	6	\$417,584,162
	Capacity Change - LRTP Network	15	\$1,047,881,319
	Capacity Change/new alignment - Minor Arterial	21	\$1,057,523,811
	Capacity change/other improvements providing access to Interstate/ Freeways interchanges	5	\$369,463,725
	Grade separations on the rail corridors	2	\$39,013,288
	Major Intersection Improvements	12	\$241,196,627
	All Highway Projects	86	\$5,723,723,821
Active Transportation	Bicycle infrastructure that serves regional travel needs	3	\$81,672,626
	Multi-use trails that connect significant destinations	18	\$594,952,684
	All Active Transportation Projects	21	\$676,625,310
Transit	New Transit Hubs/Centers/Transfer Stations	3	\$52,605,183
	New Bus Rapid Transit (BRT) Corridors	4	\$1,142,526,141
	Expansion of Existing BRT Corridors	2	\$262,705,170
	All Transit Projects	9	\$1,457,836,494
Travel Demand Management	New Park & ride lots	4	\$33,502,620
	Park & ride lot expansions	1	\$7,878,562
	All Travel Demand Management Projects	5	\$41,381,182
Subtotal		121	\$7,899,566,807
Bridges	Replacement/Rehabilitation	6	\$859,497,000
Total		127	\$8,759,063,807

*Total inflated cost for all modes includes available Regional Funds and the State of Good Repair (SGR) funds required to fund the 6 Bridge Projects.

Active Transportation

A total of twenty-one regionally-significant (large scale) active transportation projects were included in the constrained project list. This includes all unfunded segments of Fall Line Trail within the RRTPO boundary, and additional shared use paths or separated bike lanes in most of the region's localities (six of the nine). Active transportation investment totaled around \$677 million.

	Project Name	Locality	Time Band
Separated Bike Lane			
P2F_027	Cox Road	Henrico	1
Shared Use Path			
P2F_08	Fall Line Trail to VA Center Commons	Henrico	1
P2F_109	Nuckols Rd Trail	Henrico	1
P2F_114	Wilton on the James Trail	Henrico	1
P2F_147	East End/West Creek Trail	Goochland	1
P2F_158	VA-150 to Jessup Road	Chesterfield	1
P2F_07	Fall Line Trail - Richmond Sections	Richmond	2
P2F_110	Monument Ave - Willow Lawn to Bremo	Henrico	2
P2F_190	Fall Line Trail - Chesterfield Sections	Chesterfield	2
P2F_059	Providence Forge to Lanexa along US-60	New Kent	3
P2F_06	Eltham to Lanexa	New Kent	3
P2F_061	New Kent Courthouse to Talleyville along 249	New Kent	3
P2F_062	Talleyville to Charles City Co. Line	New Kent	3
P2F_063	Courthouse Rd to Charles City Co. Line	New Kent	3
P2F_09	Mountain Road	Henrico	3
P2F_111	Westham Trail - VA-150 to Goochland	Henrico	3
P2F_112	RF&P Trails - Glen Allen to Glover Park	Henrico	3
P2F_113	New Market Heights Trail	Henrico	3
P2F_140	VCT to New Kent County Line on Rte 106	Charles City	3
P2F_141	School Complex to New Kent Co. Line on Rte 155	Charles City	3
P2F_146	River Road West (Route 6)	Goochland	3

Highways

A total of eighty-six highway projects were included in the constrained project list. Projects include solutions to transportation issues which have been extensively studied and are ready for implementation, as well as those projects which are still at a conceptual level. Total Highway investment accounted for almost \$6 billion.

Many projects in the Highway grouping also include Active Transportation improvements, such as adding sidewalks or paths as part of a capacity change or intersection improvement project. Examples include those projects in the table which list as their Subtype “Active Transportation and/or Transit Infrastructure bundled with a Highway Project.” In addition, as more detailed scopes of work are development for these projects, Active Transportation facilities are required to be considered for inclusion as specified by VDOT and Commonwealth Transportation Board policy.

ID	Project Name	Locality	Time Band
New Interchange or Interchange Modification			
P2F_010	I-295 & Creighton Rd Interchange Modification	Hanover	1
P2F_065	Belvidere I-95/I-64 Interchange Improvements	Richmond	2
P2F_171	Powwhite Pkwy/Charter Colony Interchange	Chesterfield	2
P2F_035	I-295 Interchange Modification - Exit 43 to C-D Lane	Henrico	3
P2F_037	I-64 & Gaskins Rd Interchange Modification	Henrico	3
P2F_039	I-64 & US-250 Interchange Improvements	Henrico	3
P2F_064	Bryan Park Interchange Improvements	Richmond	3
P2F_075	Chippenham Pkwy at US-60/Midlothian Tpk Interchange	Multi-Jurisdiction	3
P2F_076	Chippenham Pkwy at US-360/Hull St Interchange	Multi-Jurisdiction	3
P2F_081	US-60 & Belt Blvd Interchange Improvements	Richmond	3
P2F_086	I-95 & Parham Rd Interchange Modification	Henrico	3
P2F_122	Route 1/Brook Rd Safety - Azalea Ave to Hilliard	Henrico	3
P2F_167	VA-150 & Hopkins Rd Interchange Modification	Chesterfield	3
Realignment, Extension, or Relocation			
P2F_163	Powwhite Pkwy Extension Phase 2 - Woolridge Rd to US-360	Chesterfield	2
P2F_085	New Ashcake Rd Extension to Air Park Rd	Hanover	3
P2F_105	Springfield Rd Relocation - Francistown to Olde Millbrooke	Henrico	3
Spot Safety or ITS Improvements Bundled at the Corridor Level			
P2F_121	Route 1/Brook Rd Safety - Parham to Magnolia Ridge	Henrico	1
P2F_001	U.S. Route 1 Safety - England St to Northern Town Limit	Ashland	2
P2F_148	Andersons Highway Corridor Safety Improvements	Powhatan	2
P2F_002	U.S. Route 1 Safety - Ashcake Rd to Southern Town Limit	Ashland	3

P2F_031	Glenside Drive and Horsepen Road Safety Improvements	Henrico	3
P2F_120	W. Broad St - I-64 to Goochland Line	Henrico	3
P2F_124	Nine Mile Rd Safety - Dabbs House to Laburnum	Henrico	3
P2F_125	S. Laburnum Ave Safety - Williamsburg to Nine Mile	Henrico	3
P2F_201	Route 10 Safety and Operation Improvements	Chesterfield	3
Active Transportation and/or Transit Infrastructure Bundled with a Highway Project			
P2F_108	Nine Mile Rd Safety - Gordons Ln to Dabbs House Rd	Henrico	1
P2F_118	Parham Rd Safety - St Charles Rd to Chamberlayne Ave	Henrico	1
P2F_117	Patterson Ave Safety - Three Chopt to Pump Rd	Henrico	2
P2F_077	Route 1 Great Streets Improvements	Richmond	3
P2F_115	Williamsburg Rd Safety - Randall Ave to Charles City Rd	Henrico	3
P2F_119	Parham Rd Safety - Holly Hill to Three Chopt	Henrico	3
Capacity Change - LRTP Network			
P2F_095	Pouncey Tract Rd Widening - W Broad St to N Gayton Rd	Henrico	1
P2F_009	I-295 Auxiliary Lane - I-95 SB Branch to Chamberlayne Rd	Hanover	2
P2F_188	Huguenot Rd Capacity & Safety - Robious Rd to Cranbeck Rd	Chesterfield	2
P2F_058	Route 106 Widening (2L to 4L): City Center/I-64 to Parrish Rd	New Kent	3
P2F_089	Masonic Ln/Brittles Ln Widening	Henrico	3
P2F_093	Pemberton Rd Widening - Quioccasin Rd to US-250	Henrico	3
P2F_094	Pouncey Tract Rd Widening - N Gayton Rd to Grey Oaks	Henrico	3
P2F_096	Pouncey Tract Rd Widening - Nuckols Rd to Grey Oaks	Henrico	3
P2F_099	S Airport Dr Widening - Audubon Dr to Williamsburg Rd	Henrico	3
P2F_126	Staples Mill Rd Widening - Hungary Springs to Mountain Rd	Henrico	3
P2F_160	US 360 Widening - Otterdale Rd to Magnolia Green Pkwy	Chesterfield	3
P2F_170	I-95 (Willis Road to Route 10) - Widening 6 to 8 Lanes	Chesterfield	3
P2F_187	Rt 288 SB (Powhite Pkwy - Route 360) CD Road Extension	Chesterfield	3
P2F_196	I-64 WB Auxiliary Lane between Exits 185 and 186	Multi-Jurisdiction	3
P2F_200	Rt 288 (Rt 10 - Courthouse) Widening	Chesterfield	3
Capacity Change/New Alignment - Minor Arterial			
P2F_087	Lauderdale Dr Widening - Westbriar to Edenbury	Henrico	1
P2F_198	VA-54 Widening - Frances Rd to East Corporate Limits	Ashland	1
P2F_008	Creighton Rd Widening - I-295 to Cold Harbor Rd	Hanover	2
P2F_023	Rt. 33 Widening Ph. 1 - Chickahominy River to Winns Church Rd	Hanover	2
P2F_101	Three Chopt Rd Widening - Skipwith to Horsepen	Henrico	2
P2F_102	Woodman Rd Widening - Hermitage to Hilliard	Henrico	2
P2F_144	Ashland Road (Route 623) Widening - North of I-64	Goochland	2

P2F_011	Pole Green Rd Widening - Rural Point Rd to Walnut Grove Rd	Hanover	3
P2F_015	Rural Point Rd Widening - US-301 to Studley Rd	Hanover	3
P2F_016	Rural Point Rd Widening - Studley Rd to Pole Green Rd	Hanover	3
P2F_017	Meadowbridge Rd Widening - Henrico Co. Line to Atlee Rd	Hanover	3
P2F_018	Pouncey Tract Rd Widening - Henrico Co. Line to Ashland Rd	Hanover	3
P2F_026	Church Rd Widening - Three Chopt Rd to John Rolfe Pkwy	Henrico	3
P2F_029	Creighton Rd Widening - Sandy Ln to Richmond City Limits	Henrico	3
P2F_030	Darbytown Rd Widening - City Limits to Laburnum Ave	Henrico	3
P2F_079	Walmsley Boulevard Extension & Shared Use Path	Richmond	3
P2F_091	N Gayton Rd Widening	Henrico	3
P2F_100	Three Chopt Rd Widening - Gaskins to Parham	Henrico	3
P2F_103	Woodman Rd Widening - Mountain to Hungary	Henrico	3
P2F_157	Charter Colony Pkwy (Rolling Spring - Woolridge) Widening	Chesterfield	3
P2F_161	Brandermill Pkwy Widening - Powhite Pkwy to Charter Colony	Chesterfield	3
Capacity Change/Other Improvements Providing Access to Interstate/Freeways interchanges			
P2F_033	I-295 Auxiliary Lane - I-64 WB on-ramp to Nuckols Rd SB	Henrico	3
P2F_041	I-64 Auxiliary Lane - Exits 178-180 (both directions)	Henrico	3
P2F_043	I-64 Auxiliary Lane - Exits 181-183	Henrico	3
P2F_044	I-64 Auxiliary Lane - Exits 183-185 Westbound	Henrico	3
P2F_045	I-64 Auxiliary Lane - Exits 183-185 Eastbound	Henrico	3
Grade Separations on the Rail Corridors			
P2F_003	West Vaughan Road Grade Separation	Ashland	1
P2F_004	Ashcake Road Grade Separation	Ashland	2
Major Intersection Improvements			
P2F_082	VA-10 & Walmsley Blvd	Richmond	1
P2F_078	Hull Street Intersection & Ped Improvements	Richmond	2
P2F_084	VA-161, Brookland Pkwy & Westwood Ave	Richmond	2
P2F_128	US-1 & E Parham Rd Intersection Improvement	Henrico	2
P2F_130	US-250 & Pouncey Tract Rd Intersection Improvement	Henrico	2
P2F_083	VA-161 & Broad Rock Blvd	Richmond	3
P2F_127	Staples Mill Rd & Old Staples Mill Intersection	Henrico	3
P2F_131	W Broad St and Parham Rd Intersection Improvements	Henrico	3
P2F_132	Parham Rd & Woodman Rd Intersection Improvements	Henrico	3
P2F_164	Route 1/Willis Road Intersection Improvements	Chesterfield	3
P2F_191	Courthouse Rd at Cherylann Rd R-Cut & Bike/Ped	Chesterfield	3
P2F_194	Courthouse Rd at Dakins Dr R-Cut and Bike/Ped	Chesterfield	3

Travel Demand Management/Park and Ride

A total of five Park and Ride projects are included in the constrained project list. Park and Ride investment is around \$41 million.

ID	Project Name	Locality	Time Band
Park & Ride Lot Expansions			
P2F_040	I-64 at I-295 in Short Pump - New Park and Ride Lot	Henrico	1
New Park & Ride Lots			
P2F_136	Willow Lawn/Staples Mill - New Park and Ride Lot	Henrico	1
P2F_197	US 288/US 250 Interchange - New Park and Ride	Goochland	1
P2F_019	Lewistown Rd/Lakeridge Pkwy or Ashland Park and Ride	Hanover	3
P2F_135	VA Center Commons/I-295/I-95 - New Park and Ride	Henrico	3

Transit

A total of nine transit projects were included in the constrained project list. This included six Bus Rapid Transit (BRT) routes to extend the existing East-West BRT and begin developing a North-South BRT route. The list also includes three transfer facilities where passengers can switch between different bus routes or lines. Transit investment is about \$1.5 Billion.

ID	Project Name	Locality	Time Band
New Bus Rapid Transit (BRT) Corridors			
P2F_050	North-South BRT Phase 1 - Azalea to Downtown to Stonebridge	Multi-Jurisdiction	2
P2F_053	North-South BRT Phase 2a - Virginia Center Commons to Azalea	Henrico	3
P2F_057	Mechanicsville Turnpike BRT	Multi-Jurisdiction	3
Expansion of Existing BRT Corridors			
P2F_051	Western BRT Extension Phase 1 - Willow Lawn to Parham	Multi-Jurisdiction	2
P2F_055	Western BRT Extension Phase 2 - Parham to Short Pump	Henrico	3
P2F_052	Eastern BRT Airport Extension - Rocketts Landing to Airport	Multi-Jurisdiction	3
New Transit Hubs/Centers/Transfer Stations			
P2F_047	Southside Transfer Center	Richmond	3
P2F_137	W Broad St and Parham Rd - Transfer Station and Park and Ride	Henrico	3
P2F_202	Willow Lawn Transfer Facility	Henrico	3

Bridges

While bridge replacement and rehabilitation projects are programmatic in nature and funds are distributed based on a statewide prioritization process, the RRTPO has identified six major regional bridges which are priorities for replacement or rehabilitation using State of Good Repair (SGR) funds by 2050. As programmatic investments, these projects did not go through the evaluation process and are not tied to a specific time period but are considered as a whole. Depending on the timing of implementation, these bridge projects are expected to cost between \$490M and \$767M. Estimated costs have been listed in 2029 (near term) and 2044 (long term) dollars in the summary table below to demonstrate the range of potential costs which would be covered with SGR funds.

Project ID	Project Name	Cost Low (Time-band 1)	Cost High (Time-band 3)
P2F_067	Manchester Bridge Rehabilitation	\$30,389,000	\$47,345,000
P2F_068	Lee Bridge Rehabilitation	\$45,020,000	\$70,140,000
P2F_069	Midlothian Turnpike Bridge Rehabilitation	\$33,765,000	\$52,605,000
P2F_071	Nickel Bridge Rehabilitation	\$135,061,000	\$210,421,000
P2F_072	Mayo Bridge Rehabilitation or Replacement	\$225,102,000	\$350,701,000
P2F_080	Martin Luther King Jr Memorial Bridge Rehabilitation	\$20,822,000	\$32,440,000
Regionally Significant Bridge Replacement & Rehabilitation Total		\$490,159,000	\$763,652,000

Other Regional Needs

The regional needs identified through the planning process exceed the expected revenues available to improve the regional transportation system. The list of projects that were in the Universe of Projects, but were not cost-feasible in the constrained financial plan, is included in *Technical Report H: Constrained Plan Development, Appendix E* (Illustrative List of Unconstrained Projects, or “Vision List”) and are considered regional priorities as additional revenues are made available to the region.

One component of the Vision List in Appendix E is the set of rail projects identified in the Universe of Projects. These are regionally significant projects will help to improve the region's multimodal transportation system; planning and coordination on rail projects will continue to be a part of the MPO's work going forward. The rail projects are not included in the constrained project list because rail revenue amounts are not provided at the MPO level. Rail needs represented on this list total around \$336 million. The locations of these projects can be seen on the Universe of Projects map (link in Chapter 5).

Project ID	Project Name
P2F_134	Hungary Spring Rd - Grade separated crossing over railroad tracks
P2F_138	Staples Mill Amtrak Improvements/Station replacement
P2F_139	Fulton Layover Facility - Design and construction of three storage tracks, one maintenance platform, a service pit covered by a canopy, upgrades to the existing railroad signal system for entering and exiting the site, roadway improvements for access into the facility, a parking lot for staff, and a site building for equipment storage and staff facilities.
P2F_150	Richmond to Raleigh (R2R) passenger rail alignment along the I-85 corridor. The R2R corridor, specifically the abandoned 75 miles of the S-line that VPRA acquired from CSX in November of 2022, is important to enhance and grow intercity passenger rail service in the Southeast. When combined with the Long Bridge Project, R2R will better connect Amtrak service in North Carolina and Virginia with Amtrak connections in the Northeast. Project Cost cited is the Project Development Budget for 30% design.
P2F_151	Taylorsville Third Track will construct approximately 3 miles of third track in Hanover County. It begins north of Taylorsville Road and ends south of the Doswell railroad crossing.
P2F_152	Main Street Station West Side Platforms
P2F_153	East Acca Bypass
P2F_154	Rebuilding CSX S-Line
P2F_155	Third Track Construction

Other funding programs exist at the state and federal level which are not readily assigned to the RRTPO for revenue projections. These state and federal-level programs are not included as part of the plan budget but are potential sources of funding for projects which are included in the unconstrained, or vision, list of projects. These potential sources of funding include:

Revenue Sharing Program: Revenue Sharing is a match program where the Commonwealth matches local funding dollar-for-dollar on transportation projects, up to \$5M per year. This program can help to reduce the use of Central Virginia Transportation Authority (CVTA) local funds, allowing localities to pursue additional projects that are local priorities.

Central Virginia Transportation Authority Bonds: The CVTA has the authority to issue bonds which has not been exercised to-date. As such, the financial plan assumes pay-as-you-go financing for projects funded with CVTA revenues. Through bond financing, the CVTA could leverage expected revenues to fund additional projects. If adopted, bond revenues could be used to implement additional projects on the vision list.

Commonwealth Rail Fund: This fund is the Commonwealth's primary source of dedicated funding for rail improvements and is administered by DRPT and the Virginia Passenger Rail Authority (VPRA), an independent authority which will own and manage rail infrastructure on behalf of the Commonwealth. This fund will be the primary source of revenue to implement rail improvements included in the vision plan.

Federal Discretionary Grants: The federal government offers several competitive discretionary grant programs, the most prominent of which is the Better Utilizing Investments to Leverage Development (BUILD) Grant. This program provides funding for road, rail, transit, and port projects that help achieve national objectives. The RRTPO supports applications for discretionary grants for all projects in both the constrained plan and vision project lists.



Chapter Seven

Future Transportation Network Performance

Long Range Transportation Plan



2050

Chapter 7 – Future Performance

Transportation 2050 seeks to guide transportation investment over the next 25 years in a way that advances the plan's Vision. As described in previous chapters, each potential project in the Universe of Projects was evaluated based on a set of Performance Measures derived from the plan's Goal areas. Then, during development of the constrained project list, the groups of projects included in each of the four financial packages were evaluated for the collective effect the projects would have on our future transportation system, calculated using *Transportation 2050* Objectives. Now, Chapter 7 presents an evaluation of the final set of projects included on the Constrained Project List, as approved by the RRTPO Policy Board on April 23, 2026. The evaluation in this Chapter is based on several types of considerations:

- Regional Demographics
- Performance Based Planning
 - Federal Performance Targets
 - *Transportation 2050* Objectives, using four Scenarios representing possible futures for the region.
- Air Quality Conformity

Chapter 7 also describes policy considerations and transportation planning needs that can work in tandem with the project investments included in this plan to better achieve the region's desired transportation network in 2050.



Regional Demographics Evaluation

Federal Non-Discrimination Laws and Virginia Environmental Justice Policy

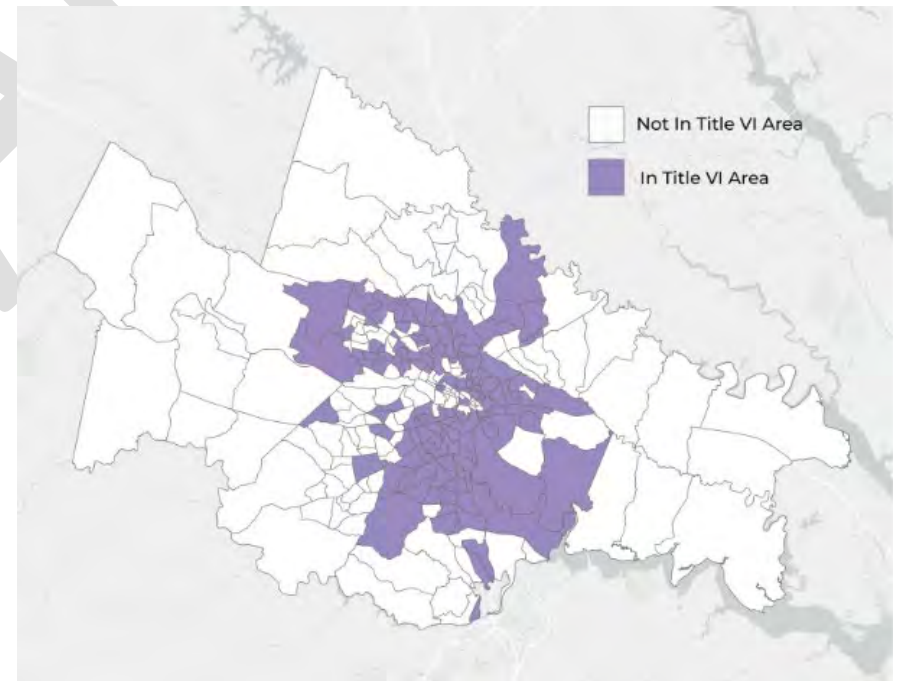
Chapter 2 describes several key federal laws pertinent to transportation planning, including Title VI of the Civil Rights Act and the National Environmental Policy Act (NEPA). In addition to the federal law, there is pertinent guidance in Virginia specified in the Virginia Environmental Justice Act (VEJA) which declares it the official policy of the Commonwealth to provide fair treatment and meaningful involvement to all people, regardless of race, color, national origin, income, faith or disability, in the development, implementation, and enforcement of any environmental law or policy.

Based on the guidance in these laws, the plan evaluation was conducted on several demographic factors in two separate analyses.

Title VI Analysis:

This analysis identified the region's minority populations, foreign born populations, and populations with Limited English Proficiency (LEP) as indicators of protected classes. 2023 American Community Survey (ACS) 5-year census estimates were reviewed to determine the regionwide metrics for each of these populations. The Title VI area in the analysis is comprised of census tracts containing any of the identified demographic groups with a population count above their designated threshold.

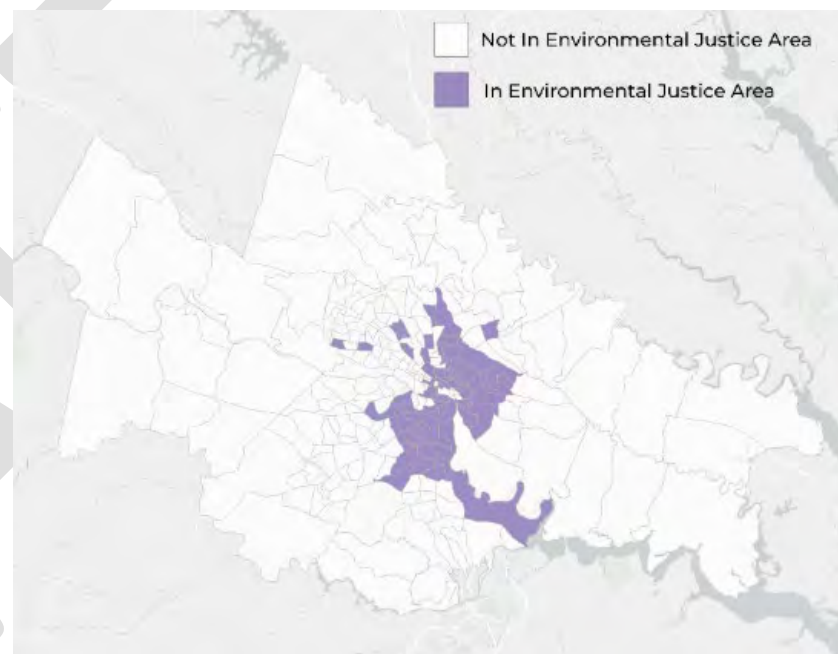
Identifying the investment in transportation projects by concentrations of Title VI populations shows how the allocation of resources might impact historically underserved communities. The results of the analysis indicate that 52% of the constrained plan project mileage is expected to serve these areas and more than 56% of the dollars proposed for investment are expected to serve the population in these areas. Since the population in these



geographies represents less than 51% of the overall regional population, this analysis supports the finding that the proposed investments are proportionally distributed. This ensures that Title VI communities are not overlooked in funding decisions.

Environmental Justice Analysis:

The Environmental Justice analysis builds on the demographics mentioned in the Title VI analysis, with additional demographic factors. These additional factors include low-income populations, population with a disability, population in female headed households, population without a vehicle, population cost burdened 50% or more, and population aged 65 or above. 2023 American Community Survey (ACS) 5-year census estimates were reviewed to determine the regionwide metrics for each of these populations. For each demographic group, a census tract was flagged for analysis if the tract was above the regional mean plus one standard deviation. A higher threshold was used due to the more complex, multifaceted nature of this evaluation relative to the Title VI analysis. The core Environmental Justice area was mapped based on flagged areas with significant concentrations of people in poverty or people from racial or ethnic minority groups as well as former federal priority environmental justice areas. In addition, all census tracts meeting the threshold for four or more demographic factors were included due to the overlapping indicators of disadvantage (see Technical Report J for additional methodology details).



Analysis of investments in transportation projects in the Environmental Justice areas indicates that 27% of the constrained plan project mileage is expected to serve these areas and about 34% of the dollars proposed for investment (base cost spending) expected to serve the population in these areas. Since the population in these geographies represents about 28% of the region's total population, this analysis supports the finding that communities that have traditionally faced barriers to investment receive a share of transportation projects that is generally proportional to their presence within the regional population.

Performance Based Planning Evaluations

Federal Performance Targets

Federal law mandates specific performance measures to ensure transportation investments directly align with national goals. Through data collection and target setting established by the USDOT, these short-term targets guide near-term programming decisions within the Transportation Improvement Program (TIP), establishing a clear link between funding priorities and anticipated regional outcomes. To build toward robust, long-term regional objectives, the plan evaluates long-range performance against these baseline federal targets across five key categories:

- **Roadway Safety:** Near-term targets focus on reducing fatalities and serious injuries for both motorized and non-motorized travel, measured by total counts and rates per 100 million vehicle miles traveled (VMT). A dedicated baseline protects vulnerable road users like pedestrians and cyclists. Long-term plan objectives expand on this foundation by striving toward a regional target of zero transportation-related deaths and serious injuries through systematic infrastructure modifications and active transportation investments.
- **Infrastructure Condition (Pavement & Bridge):** Short-term federal targets dictate specific minimum thresholds for National Highway System (NHS) pavement and bridge deck areas classified in "Good" condition, while limiting infrastructure allowed to fall into "Poor" condition. The long-term plan maintains state-of-good-repair standards adopted by VDOT and other asset owners and emphasizes proactive system resiliency, ensuring continuous preservation of the existing system.
- **Roadway Performance & Reliability:** Current targets evaluate travel time dependability by tracking the percentage of person-miles traveled that remain reliable across interstate and non-interstate corridors. Long-term objectives look past individual segments to focus on structural congestion management, prioritizing systemic land-use integration and operational strategies over pure capacity expansion to mitigate non-recurrent delay.
- **Freight Movement:** Short-term metrics utilize the Truck Travel Time Reliability (TTTR) Index to assess predictability along major logistics corridors. The plan's long-term horizon aims to secure regional economic competitiveness by optimizing targeted freight bottlenecks and supporting multimodal freight access points.
- **Transit Performance & Safety:** Short-term federal transit metrics focus on maintaining a State of Good Repair (SGR) for rolling stock, equipment, facilities, and infrastructure under Transit Asset Management (TAM) targets. Concurrently, transit safety targets track total fatalities, serious injuries, safety events, and system reliability metrics per vehicle revenue mile. Long-term plan objectives look beyond these baseline operational standards to emphasize regional transit utility—shifting focus toward structural service expansions, high-frequency corridors (such as the

Pulse BRT extensions), and zero-fare structural sustainability to maximize system-wide accessibility and regional connectivity.

Transportation 2050 Plan Objectives

Traditional long-range transportation modeling has historically operated under the assumption of a single, fixed future. By treating baseline growth projections as definitive, legacy planning methods risk optimizing a region's infrastructure for a reality that may not align with actual long-term development patterns, demographic shifts, or technological disruptions.

To move beyond these rigid constraints, the Pathways to the Future (P2F) framework introduces exploratory scenario planning. Rather than attempting to precisely predict the future, this approach maps a broader uncertainty space by manipulating regional "drivers of change"—such as socioeconomic growth rates, technological adoption levels, climate resilience behavior, and geographical land-use allocation. By cross-testing transportation performance against a variety of structurally distinct futures, the region can identify vulnerabilities, anticipate critical turning points, and prioritize robust policy interventions that provide cumulative benefits regardless of how the future ultimately unfolds.

The framework establishes a comparison standard through a historical baseline and evaluates the region's resilience across four alternative scenarios:

1. **Baseline Land Use ("Trendline Growth"):** Serves as the quantitative benchmark. It assumes that regional population and employment growth follow standard historical trajectories, that clean energy and technology are adopted purely along national trend lines, and that spatial settlement matches currently adopted local comprehensive plans.
2. **Ecotopia (Resilient Growth Scenario):**

5. **RVA Sinks (Doomsday Scenario):** Tests system resilience under severe economic and environmental strain. It models **low growth** driven by consecutive man-made and natural disasters, compounding challenges in housing affordability, and a loss of major regional employers, resulting in a net out-migration of businesses and residents.

By examining the region's transportation investments across these five distinct envelopes of growth rates and spatial patterns, the planning process shifts from reactive planning toward robust, proactive risk management.

To track progress toward the region's long-term vision, the plan examines the four core goals, backed by the seventeen performance objectives targeted for 2050 (see Chapter 4). Because the underlying forces driving these goals vary, the plan utilizes a dual-track analytical framework to evaluate performance across the alternative futures. The first track is analysis that uses scenario outcome modeling, and the second track is analysis that considers a fixed investment single strategic trajectory, paired with qualitative risk narrative. These tracks are described below.

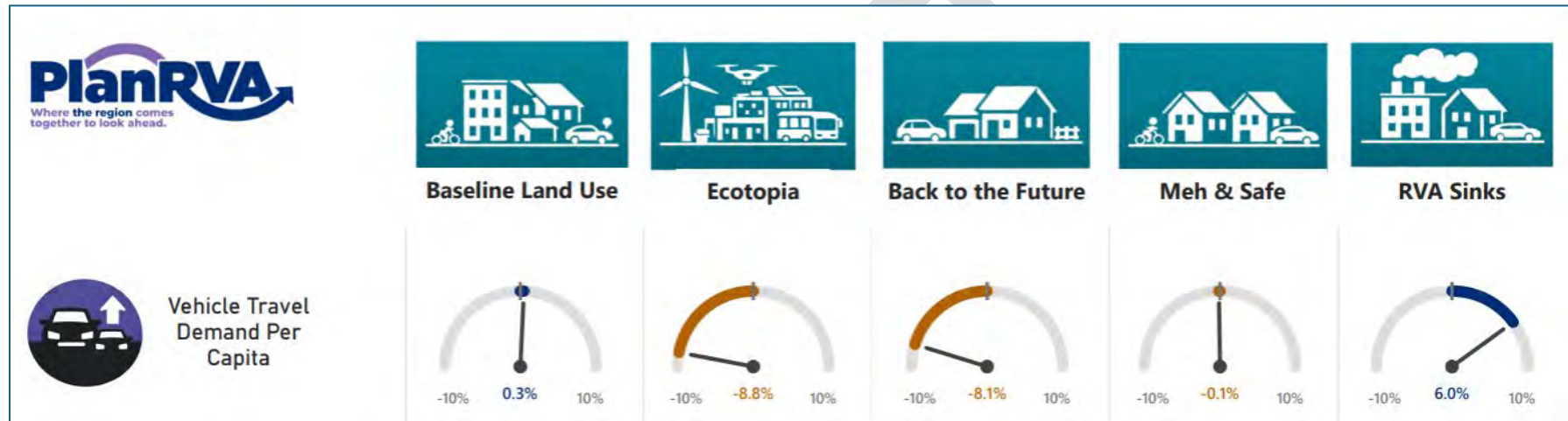
1. Scenario Outcome Modeling

For objectives directly dependent on spatial growth patterns, travel behavior, and technology adoption, metrics are modeled dynamically across all five scenarios, all of which assume the same set of planned transportation investments (the constrained list of projects in this plan) are in place, but differ in their growth rate, spatial pattern and other assumptions, as described above. Analysis of these objectives yields distinct quantitative outputs for each future. These results were then compared against a no-build scenario using the Baseline future, but without the planned transportation investments (the 2050 No-Build Scenario), to demonstrate how changes in growth rates, land use patterns, and technology adoption can alter the performance of the exact same set of investments.

2. Fixed-Investment Narrative Evaluation

For objectives tied to fixed programmatic funding, system baseline expansions, or macro-level external variables (Ex. Changes in Telework, Climate Change, Energy Use, and Technology) the plan evaluates performance through a single strategic trajectory, paired with a qualitative risk narrative. This narrative explores how external scenario uncertainties will accelerate or hinder the region's ability to achieve its goals.

Grouped by plan goal, the following pages provide information about the quantitative outputs for each of the plan objectives, portrayed in "dashboards". This is a way to show multiple data points in relation to each other. The dashboards present each scenario's results as a percent difference from the 2050 No-Build Scenario. For example, for Vehicle Travel Demand Per Capita, Baseline Land Use is showing a 0.3% increase from the No-Build Scenario, and Ecotopia is 8.8% lower than the No-Build Scenario.



Goal A: Safety: A transportation system where no one is killed or seriously injured, and people feel secure and comfortable regardless of how they travel.

Analysis for the Safety objectives was done using the Fixed-Investment Narrative Evaluation track because beyond the investments in the plan, actual future safety outcomes are a shifting balance of competing forces across the uncertainty space that the scenarios in this plan consider. For example, high-growth, decentralized scenarios increase total VMT, speed differentials, and conflict points, structurally elevating regional crash exposure and severity relative to more compact development patterns with lower speeds or lower growth scenarios. Similarly, advancements in autonomous vehicle safety technology, connected infrastructure, and emergency medical response times will naturally suppress fatality and injury rates over time, independent of localized infrastructure design but are unable to be modeled at this time.

While the safety objectives were not analyzed across the five future scenarios, data analysis was able to project the effect of planned transportation investments on the number of fatal or serious injury crashes in 2050.

How Well Do We Meet Objectives?
A1. By 2050, the number of people killed or seriously injured on all roadways will be reduced by 100%.
A2. By 2050, the rate (per 100 million VMT) of people killed or seriously injured on our roadways will be reduced by 100%.
The plan's specific projects (projects on the constrained project list that would directly reduce crashes) are expected to prevent an estimated 28 fatal and 165 serious injury crashes per year by 2050. This constitutes an approximately 23% reduction in fatal and serious injury crashes. The plan objectives and the regional goal under Vision Zero is simple: zero traffic deaths or serious injuries on roadways. While a projected 23% reduction by 2050 means the region isn't hitting that absolute target, this plan makes genuine progress towards that target by upgrading our most dangerous roads and intersections.
A3. By 2050, the number of people killed or seriously injured while biking and walking on our roadways will be reduced by 100%.
The projects selected primarily focus on regional, shared-use paths to build the backbone of our All-Ages and Abilities (AAA) network. However, a regional trail is only as effective as the local streets connect to it. Everyday safety measures like sidewalks, crosswalks, and localized pedestrian crossings are funded through flexible local investment buckets. To make our entire network genuinely safe and inclusive, local governments would need to complement regional investments with local policies and dedicated funding.

Key Takeaway

The projection of fatal and serious injury crashes above is based only on analysis of the constrained project set. However, the plan also includes over \$700 million for systemic safety improvements through the Virginia Highway Safety Improvement Plan. If the High-Injury Network (HIN) and associated active transportation and transit vision networks are systematically coded into routine project development, this \$700 million investment and other project funding can be most efficiently targeted to high-need corridors. The region can prioritize safety investments along its complete multimodal networks, ensuring that every transit corridor, pedestrian and biking facilities are designed defensively from the outset. Because vulnerable road users face the highest systemic risk, formalizing these vision networks within project development would help ensure that safety funding is actively directed toward pedestrian crossings, protected bike lanes, and transit access points. Reference the Strategies under the Safety Goal in Chapter 4 and the Policy Considerations and Needs section below.

Goal B: Sustainability: A cleaner transportation system that provides choices and meets the needs of the current generation and provides the same opportunity for future generations.

How Well Do We Meet Objectives?

B1. By 2050 the percentage of volume of freight moved via intermodal transportation (rail or through the port) will increase by 50%.

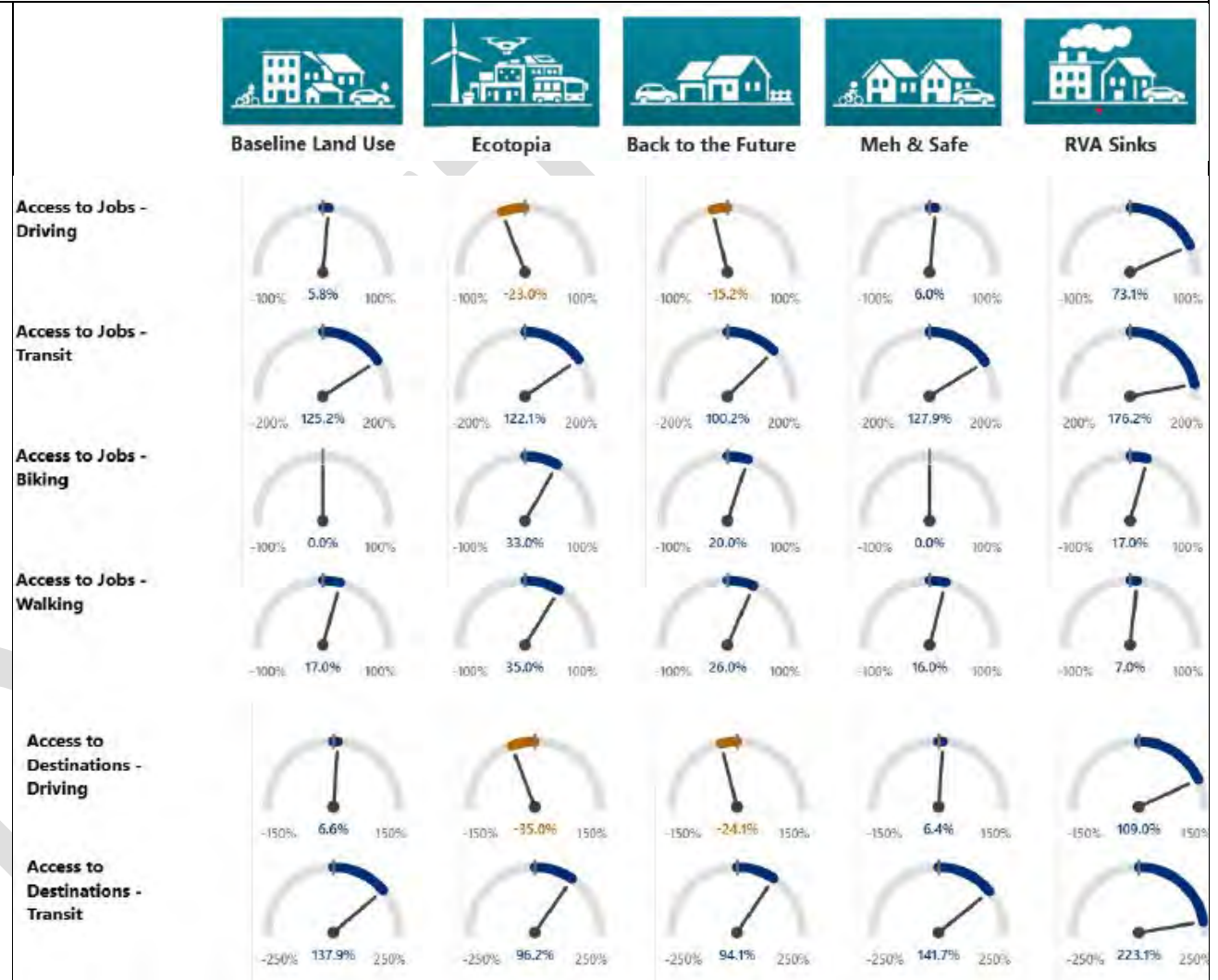
Analysis for objective B1 was done using the Fixed-Investment Narrative Evaluation track because achieving a 50% volume increase is fundamentally dependent on container throughput at the Richmond Marine Terminal and its connection to the Port of Virginia, rather than regional land-use shifts. Highway projects handle the "last mile" of local delivery, but the foundational long-haul rail investment is listed in the unranked Vision List due to private ownership and distinct federal funding streams that do not flow through the TPO. Keeping rail priorities formalized on the Vision List ensures the region can quickly capitalize on freight-specific grants and private partnerships, safely managing the transition of goods from water to rail to local roads.

Analysis for the remaining objectives in this Goal (B2-B5) was done using the Scenario Outcome Modeling – see the **dashboard dials** beside each narrative.

B2. By 2050, the average jobs and weighted destinations per capita accessible within 30 minutes by all modes (driving, transit, biking, walking) at AM Peak Hour (6:30AM-8:30 AM) will increase by 15%.

Access to Jobs. Analysis shows a generally directionally solid result in terms of meeting this objective's target. For two of the modes – transit and walking - there are robust results across future scenarios, in most cases either meeting or exceeding the target percentage. Access to jobs through walking was also fairly robust, with the objective met under three of the five scenarios. However, for driving, the target was missed in almost all scenarios due to congestion outpacing infrastructure. High-growth scenarios like Ecotopia and Back to the Future actually saw a decrease in access.

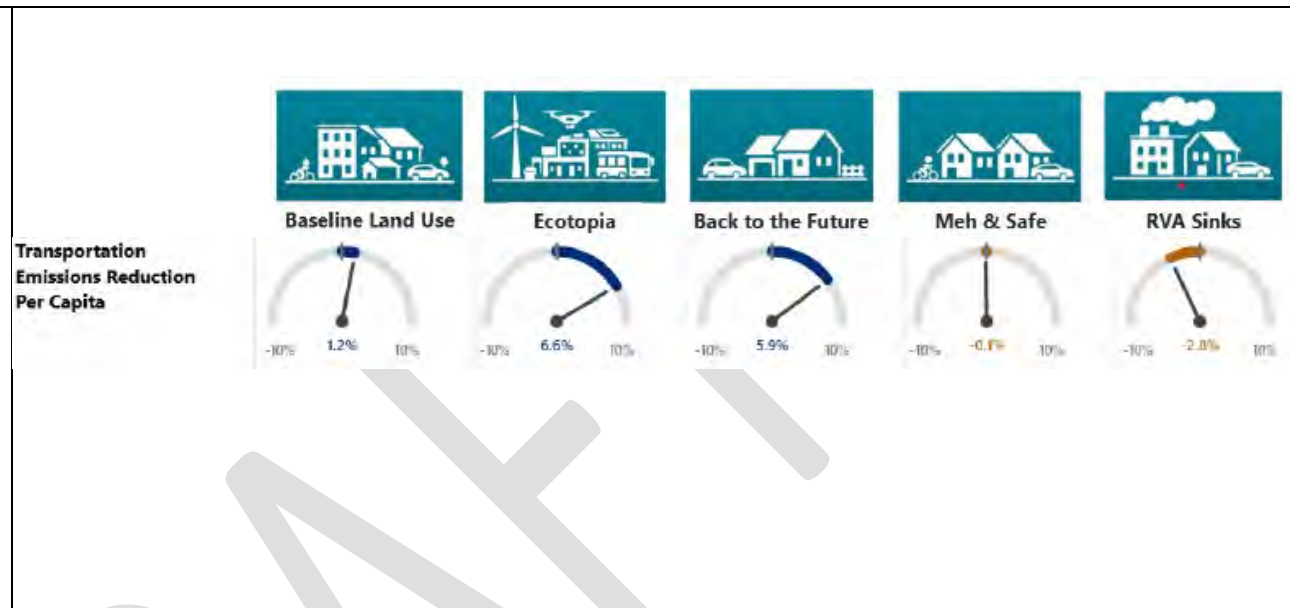
Access to Destinations. Analysis shows a mixed picture result in terms of meeting this objective's target. For three of the modes – driving, biking and walking – the target is generally not met across the future scenarios, with a few exceptions. Transit results were much more positive and robust across future scenarios, as the target was met and heavily exceeded across all scenarios. Note that this modeling result does not capture prospective new service locations, which would likely improve the results.



B3. By 2050, the percentage of residents and jobs within one-half-mile radius of public transit lines will increase by 10%.

Analysis shows that the region is projected to meet the target percentage increase across the future scenarios, both for residents and jobs.	     Transit Access Coverage
B4. By 2050, the total daily vehicle miles travelled, and the average number of vehicle miles travelled per person each year will be reduced by 10%.	
VMT is heavily dependent on spatial growth. While no land-use scenario fully achieves the 10% per capita reduction, the high-growth, compact scenarios (Ecotopia and Back to the Future) come very close to meeting this target. Conversely, under the RVA Sinks scenario, per capita VMT increases due to relatively low availability and utilization of transit, walking, and biking options.	     Vehicle Travel Demand Per Capita
B5. By 2050, transportation related emissions per capita per year will be reduced by 75%.	
This objective sits at the intersection of technology and travel behavior related indices from the scenario planning process. The model calculates tailpipe emissions by factoring in the projected rate of electric vehicle (EV) adoption alongside total VMT. For this reason, a	

scenario with high VMT but rapid fleet electrification may yield better emissions reductions than a low-VMT scenario reliant on fossil fuels. Under lower growth scenarios (RVA Sinks, Meh & Safe) emissions per capita increase as the region experiences less congestion and driving remains the most convenient choice. By contrast, emissions per person are reduced the most in the higher growth scenario where other modes of travel become more convenient, and more goods and services are provided locally.



Key Takeaway

Achieving regional sustainability fundamentally depends on the integration of land use, transportation, and housing strategies, as housing density and location strongly influence daily travel patterns and transit viability. In addition, macro-level external variables—like fleet electrification and federal CAFE standards influence the region’s ability to reach sustainability objectives. The high degree of variability in performance for the objectives discussed above in the varying futures reinforces the value of continuing to transition away from static transportation modeling toward more exploratory and scenario planning frameworks that allow stress-testing infrastructure investments to protect public capital against future uncertainty. Reference the Strategies under the Sustainability Goal in Chapter 4 and the Policy Considerations and Needs section below.

Goal C Reliability: A consistent and predictable transportation experience for all people regardless of how they travel.

Analysis for objectives C-1 through C3 in this Goal was done using the Scenario Outcome Modeling – see the **dashboard dials** beside the narrative.

How Well Do We Meet Objectives?

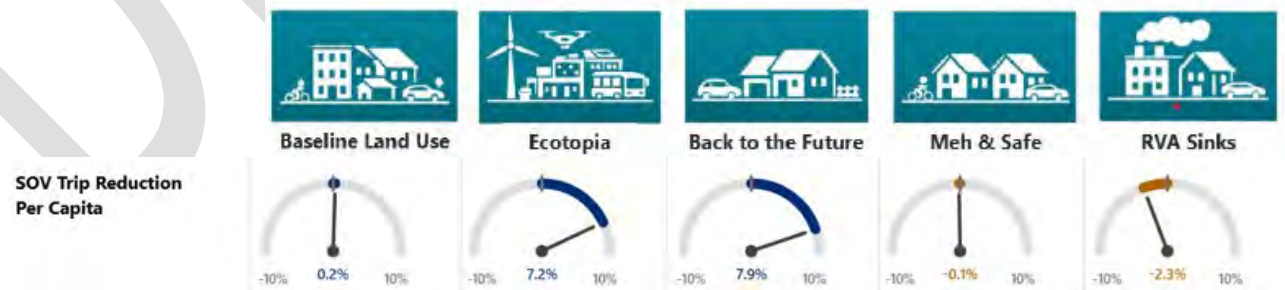
CI. By 2050, peak-hour traffic delays (hours of delay) will be reduced by 10%.

The plan sets a target of reducing peak-hour delay by 10%. The region only meets this target in the low-growth RVA Sinks scenario, while moderate-growth scenarios like the Baseline and Meh & Safe approach it. In these scenarios, the lower amount of growth injects fewer new vehicles into the network so traffic volumes remain below physical capacity. Conversely, high-growth scenarios are farther from meeting the target. The compact Ecotopia sees delay rise by 30.5%, while the car-centric, sprawling Back to the Future scenario experiences a 201.83% increase in delay as decentralized growth results in the roadway network absorbing a higher number of private vehicle trips.



C2. By 2050, the percentage of single-occupancy vehicles trips will be reduced by 10%.

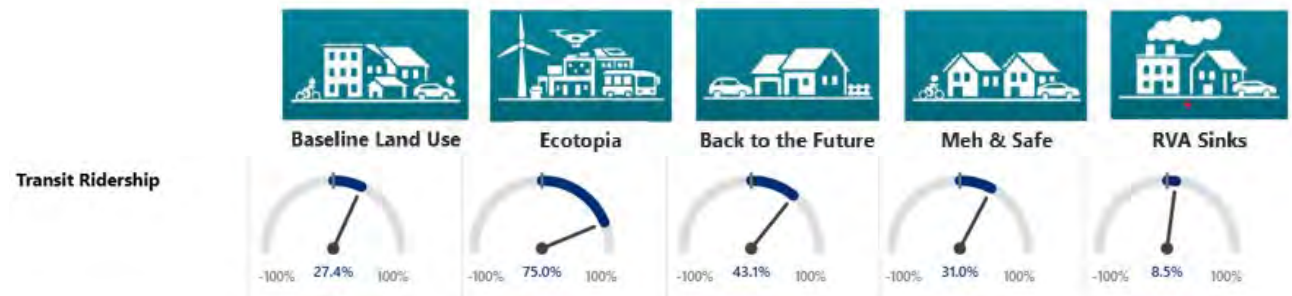
No scenario comes close to achieving the 10% reduction target. However, the high-growth Back to the Future and Ecotopia scenarios make the most progress. In these futures, population growth mathematically dilutes the increased SOV share of total



travel while compact land-use patterns increase the statistical probability of successful trip matching for transit, walking, and biking. In contrast, the RVA Sinks scenario sees SOV trips increase.

C3. By 2050, the average annual daily transit ridership will increase by 75%.

Ecotopia leads with a 75.0% ridership surge by concentrating growth into dense, transit-oriented development patterns that maximize proximity to transit lines. Back to the Future generates the second-highest increase. Despite decentralized sprawl, its population growth increases the number of residents in the expanded Bus Rapid Transit (BRT) footprint, while rising road congestion would encourage drivers to switch to transit. Meh & Safe and Baseline capture steady, incremental gains through moderate regional growth and balanced expansion. RVA Sinks yields the lowest gains.



Analysis for the remaining objectives in this Goal was done using the Strategic Trajectory Evaluation.

C4. By 2050, the miles of dedicated infrastructure for biking and walking will increase by 25%.
Based on the planned transportation investments, Active Transportation is locked in at a 60% increase in dedicated miles across all scenarios, comfortably outpacing the 25% planning objective. While the physical mileage built is identical in every scenario, its practical utility would vary. As shown in the accessibility modeling, this 60% infrastructure expansion delivers its highest return on investment in Ecotopia, where compact development places destinations within a walkable or bikeable distance of these new paths.
C5. By 2050, the Bridge & Culvert Deck Area on the National Highway System classified as in 'Good' condition will increase to 10% and 'Poor' condition will be reduced to 0%.
Since the plan includes pavement and bridge maintenance as separate, dedicated funding, this objective and objective C6 were not included in scenario analysis. As further detailed in Technical Report J, this funding level is projected to result in 93% of bridges across the state being in a state of good repair by 2050. While these investments will not achieve 0% poor condition, they are expected to continue to increase the deck area in good condition through proactive maintenance and repair.
C6. By 2050, the pavements on the National Highway System which are in good condition will increase to 70%.
The level of maintenance investment included in this plan is expected to achieve 82% fair or better pavement conditions on interstate and high-volume roadways, with lower percentages on low volume primary and secondary roads. Over time, the expectation is that fewer roads would be in fair condition as proactive, preventative maintenance leads to more roadways being in good condition through early, lower cost interventions. This approach is consistent with the plan goal of 70% of NHS pavements in good condition.

Key Takeaway
The contrast between a 201.83% increase in peak-hour delay under the sprawling Back to the Future scenario and the robust ridership gains under the compact Ecotopia scenario suggest that the reliability benefits, particularly around congestion, do not materialize in higher growth scenarios. An adaptive approach which shifts focus to development patterns and multimodal solutions may be needed if the region appears to be on a higher growth trajectory. Reference the Strategies under the Reliability Goal in Chapter 4 and the Policy Considerations and Needs section below.

Goal D: Resiliency: A transportation system that prepares, withstands, and recovers quickly from disruptions caused by natural disasters, extreme weather events, and other emergencies.

How Well Do We Meet Objectives?	
D1. By 2050, 10% of the at-risk transportation infrastructure on the LRTP Network will be improved to withstand extreme weather events and natural disasters.	
For scenario modeling, the assessment of at-risk infrastructure focused on flood risk, including from projected sea level rise. While the scenarios have some differences in assumptions, the parts of the region affected by the resulting variability were relatively limited, and as a result, all scenarios were projected to impact the same amount of mileage. All scenarios are projected to meet the target at-risk mileage threshold.	Infrastructure Resilience Baseline Land Use -100% 17.1% 100% Ecotopia -100% 17.1% 100% Back to the Future -100% 17.1% 100% Meh & Safe -100% 17.1% 100% RVA Sinks -100% 17.1% 100%
D2. By 2050, the redundant capacity of the Transportation Network in the PM Peak Period (4:30-6:30 PM) will be increased by 5%.	
The RVA Sinks and Baseline scenarios easily surpass the 5% target In RVA Sinks, economic contraction and net out-migration preserve redundant capacity simply because fewer drivers are on the road. High-growth scenarios show sizeable declines in redundant capacity. In the high-growth scenarios, the PM peak hour compresses standard workplace commuting with school, retail, commercial, and freight traffic, generating thousands of simultaneous trips in dense Traffic Analysis Zones (TAZs); this surge overwhelms regional baseline capacity gains.	Network Redundancy - Driving/Transit Baseline Land Use -200% 9.1% 200% Ecotopia -200% -39.6% 200% Back to the Future -200% -200.0% 200% Meh & Safe -200% -0.9% 200% RVA Sinks -200% 26.5% 200% Network Redundancy - Active Transportation Baseline Land Use -100% 83.9% 100% Ecotopia -100% 83.9% 100% Back to the Future -100% 83.9% 100% Meh & Safe -100% 83.9% 100% RVA Sinks -100% 83.9% 100%

D3. By 2050, the overall average systemwide Transportation Network connectivity will be increased by 2%.

Network Connectivity (Driving and Transit) - The regional connectivity target is met in Back to the Future and Ecotopia, driven by stronger transit-oriented and compact development patterns increasing route options and network links. Meh & Safe surpasses the 2% threshold, but the Baseline & RVA Sinks scenarios miss the regional target. Low-growth conditions and economic contraction lead to a net decrease in systemwide connectivity, as development is less effective at leveraging or expanding the network's potential.

Network Connectivity (Active Transportation) - Active Transportation connectivity holds steady across all future land uses. Alternative low-stress walking and biking routes are established equally by the fixed fiscal blueprint but fall short of reaching the regional target.



Key Takeaways

The greatest variability in the objectives for this Goal is for the Network Redundancy for driving and transit. Results for this objective are strongly affected by how growth is distributed across the region. In the high-growth scenarios, the decreases in redundant capacity indicate that peak-hour travel demands can overwhelm the network if commuter, commercial, and freight traffic is not coordinated regionally. Reference the Strategies under the Resiliency Goal in Chapter 4 and the Policy Considerations and Needs section below.

Air Quality Conformity Evaluation

Air quality conformity is a Federal requirement that requires RRTPO staff to ensure the projects from Transportation 2050 collectively contribute to the air quality improvement goals as stated in the Clean Air Act (CAA). The transportation projects proposed by Transportation 2050 must not cause new air quality violations or worsen existing violations. The Air Quality section in Chapter 3 provides additional information about the region's air quality attainment status, and Chapter 6 and *Technical Report G: Project Prioritization Process Report* note the inclusion of an Air Quality Performance Measure in project scoring. This section describes the additional step of demonstrating conformity for the long-range transportation plan and the Transportation Improvement Plan (TIP). The constrained list of projects in Transportation 2050 and the ungrouped projects in the FY27-30 TIP constitute the RRTPO set of projects for the purpose of this analysis.

An interagency consultation meeting was held on May 12, 2026 to review the process and methodology for the conformity analysis. The report was advertised and open for public review from May 15th to June 14th, 2026. There were no comments were received from the public. The Air Quality Conformity Report was approved on (Date) by the RRTPO Policy Board, and the approved report was submitted to FHWA on (Date). The Federal Conformity Determination will be received within 45 days of submittal to FHWA.

The Richmond Region is currently meeting all of EPA's air quality standards. Transportation 2050 is not anticipated to cause or contribute to a violation of any air quality standards. For a more detailed overview of the process, see *Technical Report K: Air Quality Conformity*.

Policy Considerations & Needs

Not all outcomes of the long-range transportation planning process are specific to project-based solutions. Some of the most effective ways to enact change over such a long timeframe are to focus efforts at both a regional and local scale to assess and update policies that impact transportation decisions. Policy considerations for the RRTPO and local governments to consider are listed below.

Land Use is shown to be a major driver of transportation network performance.

Consideration: The Scenario Planning evaluation section above shows the significant impact of land uses on future transportation network performance.

Recommendation: Review and strengthen policies and analytical framework around integration of land use, housing, and transportation.

Discussion: Land use, housing, and transportation fundamentally dictate a community's economic and environmental performance. Undertaking a unified analytical framework that merges all three of these elements is critical for unlocking sustainable regional growth, ensuring that infrastructure investments directly reinforce housing affordability and economic accessibility rather than working at cross-purposes. By updating planning policies to evaluate these sectors collectively, planners can leverage land-use zoning to proactively solve transportation and housing challenges before they compound.

To turn this recommendation into reality, RRTPO and regional partners should adopt integrated forecasting models that explicitly simulate how a change in one sector ripples through the others. For example, updating zoning policies to allow high-density, mixed-use zoning around transit nodes (Transit-Oriented Development (TOD)) directly reduces vehicle miles traveled while simultaneously expanding the housing supply where it is needed most. Strengthening these regulatory frameworks ensures that public infrastructure investments are structurally aligned with local housing needs and commercial growth, ultimately driving better fiscal performance, lower household costs, and more resilient urban centers.

Legitimate uncertainty around the shape of future development should continue to drive improved planning for uncertain outcomes.

Consideration: Compare previous LRTPs forecasts to current socioeconomic baseline data to assess past predictive performance, and continue to improve forecasting and modeling tools.

Recommendation: Continue scenario planning for the next LRTP and explore tools and opportunities to expand its use more broadly for robust decision making.

Discussion: Historically, LRTPs (Metropolitan Transportation Plans) relied on a singular baseline forecast, effectively betting public infrastructure investments on a lone, static predictive framework. However, minor shifts in macro-trends, such as sudden changes in telecommuting, fuel pricing, or population distribution can render long-range travel demand models inaccurate. Continuing to expand exploratory scenario planning for the next LRTP cycle ensures that the region's long-range strategies are intentionally designed to perform well across a wide array of future conditions.

Expanding the use of advanced exploratory tools will allow the agency to seamlessly shift toward Robust Decision Making (RDM) and Decision Making under Deep Uncertainty (DMDU) frameworks. Tools such as VisionEval provide rapid, sketch-planning capabilities to test hundreds of policy and land-use permutations, specifically analyzing variables like vehicle miles traveled (VMT) and household costs. Meanwhile, the TMIP-EMAT (Travel Model Improvement Program - Exploratory Modeling and Analysis Tool) functions as a powerful cover around the agency's existing travel demand models, leveraging cloud-based experimental designs to run thousands of simulated futures within seconds. With these systems, planners can systematically stress-test long-range plans, pinpoint critical vulnerabilities and bottlenecks, and isolate low-impact, flexible investments that protect public capital.

Formalize the Congestion Management Process (CMP) more tightly into the project prioritization process.

Consideration: Before considering capacity expansion projects, the most efficient transportation planning framework considers first land use, then operational improvements, then multimodal solutions.

Recommendation: Develop policy framework to formalize demonstration of CMP-style solutions hierarchy.

Discussion: To truly address congestion and maximize the effectiveness of public funds, the region should explore embed a strict solutions hierarchy directly into the project selection process. By formalizing the CMP within the overarching project prioritization framework, agencies establish a transparent protocol that requires sponsors to exhaust lower-cost, high-efficiency interventions before requesting capital-intensive expansions. Under such a framework, candidates would first consider if altered Land Use strategies could address the issue, followed by implementing Operational Improvements (such as intelligent transportation systems or signal optimization) and Multimodal Solutions (like transit and active transportation infrastructure). Only after these three tiers are thoroughly analyzed and proven insufficient would a traditional capacity expansion project be considered.

To operationalize this approach, the agency should develop a rigorous policy framework that mandates a structured "demonstration of compliance" for all submitted projects. This framework functions as a gateway process: project sponsors must provide data-backed evidence showing that they have systematically evaluated and advanced through the hierarchy, proving why land-use, operational, or multimodal adjustments alone cannot solve the localized bottleneck.

Vision networks need to be fully integrated into the plan.

Consideration: The region has identified Vision networks for the transportation modes, but not fully included the networks in project development and LRTP plans.

Recommendation: Develop stable project inclusion guidelines including definition of major roads for continuity between updates.

Recommendation: Develop policy to ensure adopted vision networks are fully incorporated into project development and design.

Discussion: A frequent failure in the planning cycle occurs when a vision network is formally identified, but lacks a clear mechanism for funding or implementation, causing it to drop out of subsequent updates. To bridge this gap and maintain continuity, the agency must develop stable project inclusion guidelines that include a standardized, cross-jurisdictional definition of "major roads." Establishing these baseline criteria ensures that critical regional corridors remain consistently prioritized across different planning cycles, preventing fragmented networks and protecting long-term multimodal investments from being overlooked during routine updates.

Interregional coordination

Consideration: Discrepancies in border-zone socioeconomic data and inconsistent travel demand modeling assumptions between adjacent regions limit the accuracy of cross-boundary travel forecasts and impact regional project prioritization.

Recommendation: Collaborate with neighboring planning agencies to harmonize socioeconomic data collection timelines, standardize demographic forecasting methodologies, and build a unified, multi-regional modeling framework to better capture interregional commuter patterns and freight flows.

Discussion: The regional transportation network functions as a contiguous system, while travel demand modeling and demographic forecasting remain fragmented by MPO boundaries. Disconnects in model base years, employment

definitions, and population growth projections along border zones create inaccurate traffic forecasts. These technical inconsistencies complicate the evaluation of interregional freight corridors and commuter sheds.

Aligning socioeconomic data horizons and modeling assumptions between adjacent MPOs is critical to creating a legally defensible, fiscally constrained plan. Establishing a unified analytical foundation ensures that multi-jurisdictional corridor investments are evaluated against a single, agreed-upon baseline, accelerating regional consensus and optimizing funding prioritization.

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