

An aerial photograph of a town during autumn. The town is nestled in a valley with rolling hills and mountains in the background. The landscape is filled with trees displaying vibrant shades of orange, yellow, and red. A major highway cuts through the town, with several cars and trucks visible on the road. To the right, there is a large industrial or institutional building complex with multiple wings and parking lots. The town itself is a mix of residential houses, smaller buildings, and green spaces. The overall scene is a blend of natural beauty and human-made infrastructure.

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6.1 Overview

 Because transportation infrastructure is used by citizens almost every time they leave their house, transportation is a frequent topic of conversation and criticism. Though Roanoke County's major roads were primarily developed in the 1960s and 1970s when counties did not build or request sidewalks, citizen desires have changed. Roanoke County has spent considerable time and resources since the 2005 Comprehensive Plan was adopted to focus on not only improving area roadways, but also improving multimodal infrastructure throughout our community with the goal of allowing residents to leave their cars at home and travel by other means.

This chapter lays out the existing conditions of transportation in Roanoke County, discusses potential trends that could influence transportation in the next fifteen years, and identifies key issues and needs for the Roanoke County transportation system.

Organizations essential to the development of transportation infrastructure in Roanoke County are discussed (Sec. 6.2), as are relevant transportation plans and studies (Sec. 6.3), and changes to the transportation planning and funding environment since the last Comprehensive Plan was adopted in 2005 (Sec. 6.4). The separate-but-overlapping transportation networks that serve the various modes of transportation available within Roanoke County are discussed one-by-one. These are: Roads (Sec. 6.5), Transit (Sec. 6.6), Bicycle & Pedestrian (Sec. 6.7), Greenways & Trails (Sec. 6.8), Rail (Sec. 6.9), and Air (Sec. 6.10). An overview of emerging and future transportation technologies that could be deployed in Roanoke County in the next fifteen years follows (Sec. 6.11), and the chapter concludes with a summary of the existing state of the Roanoke County transportation system and what are anticipated to be the primary issues faced by it over the next fifteen years (Sec. 6.12). Project recommendations and implementation strategies are outlined in Chapter 10.



Construction on Route 419



Route 220 at Buck Mountain Road and Stable Road

6.2 Organizations



The organizations covered in this section are those that are essential to the development and continued functioning of the Roanoke County transportation system. These organizations are varied in their size, focus, jurisdiction, and overall level of influence, but the Roanoke County transportation system would not be where it is today, and would not be adequately prepared for the future, without every one of them.

Virginia Department of Transportation

The Virginia Department of Transportation (VDOT) builds, maintains, and operates public roads, bridges and tunnels in the Commonwealth of Virginia. VDOT is responsible for all public roads in Virginia counties, except for roads in Arlington and Henrico Counties. Cities and towns typically

maintain their own roads. Roanoke County's public roadways are owned and maintained by VDOT, and are prioritized in the following manner:

1. Interstates (I-81 and I-581)
2. Primary Routes numbered 1 through 599
3. Secondary Routes numbered 600 and greater

VDOT is divided into nine highway districts, which are then further divided into 31 residencies. Roanoke County is located in the 12-county Salem District which stretches from West Virginia to North Carolina. Roanoke County is also located within the Salem Residency with Botetourt and Craig Counties. The map on page 6-8 shows the counties and cities included in the VDOT Salem District and Salem Residency.

County staff works closely with VDOT staff on

a variety of projects spanning from interstate improvements to maintenance needs.

Virginia Department of Rail and Public Transportation

The Department of Rail and Public Transportation (DRPT) is a state agency that reports to the Secretary of Transportation and the Commonwealth Transportation Board. DRPT's mission is "to connect and improve the quality of life for all Virginians with innovative transportation solutions" (DRPT, 2023).

DRPT's programs include:

- Passenger and freight rail
- Public transportation including bus providers, commuter rail, heavy rail, light rail, paratransit and ferryboat
- Local and regional commuter assistance programs

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Since 2021, DRPT has assisted Roanoke County with funding to offset the cost of both the CORTRAN and McAfee Knob Trailhead Shuttle services.

Virginia Passenger Rail Authority

The Virginia Passenger Rail Authority (VPRA) was created during the 2020 General Assembly session to promote, sustain, and expand the availability of passenger rail service in Virginia. VPRA is an independent subdivision of the state, with board members appointed by the Governor, that works in collaboration with the Virginia Department of Rail and Public Transportation.

In June 2022, VPRA finalized the purchase of a section of track from Norfolk Southern that runs from Salem to Christiansburg, to serve the expansion of Amtrak service to Christiansburg. This track runs through western Roanoke County, roughly following the path of the Roanoke River.



VPRA is allowed to authorize recreational trails within their property in western Roanoke County, provided these trails meet rigid safety standards.

Commonwealth Transportation Board

The Commonwealth Transportation Board (CTB) members are appointed by the Governor and approved by the General Assembly. The CTB is comprised of 17 members including:

- Secretary of Transportation
- Commissioner of VDOT
- Director of DRPT
- One representative from each of the nine highway districts
- Two At-Large Urban
- Three At-Large Rural

The CTB oversees seven transportation agencies including:

- VDOT
- DRPT
- Department of Aviation
- Virginia Port Authority
- Motor Vehicle Dealer Board
- Virginia Commercial Space Flight Authority
- Department of Motor Vehicles

The CTB adopts the Six-Year Improvement Program (SYIP) annually which programs funding for transportation projects across the state over six years.

Office of Intermodal Planning and Investment

The Office of Intermodal Planning and Investment (OPII) is an Office of the Secretary of Transportation. OPII focuses on statewide multimodal and intermodal transportation planning. OPII staff also oversee the SMART SCALE program and VTrans, which is Virginia's multimodal surface transportation plan.

Roanoke Valley-Alleghany Regional Commission

The Commonwealth of Virginia is divided into 21 Planning Districts. The Roanoke Valley-Alleghany Regional Commission (RVARC) is comprised of elected officials and citizens appointed by the following member governments:

- Alleghany County
- Botetourt County
- Craig County
- Franklin County
- Roanoke County
- City of Covington

- City of Roanoke
- City of Salem
- Town of Clifton Forge
- Town of Rocky Mount
- Town of Vinton

RVARC assists its members with technical and program services such as grant assistance, management services for program implementation, land use planning services, mapping and transportation.

RVARC is responsible for the following documents:

- *Roanoke Valley-Alleghany Regional Comprehensive Economic Development Strategy*—establishes the region's economic development goals and identifies strategies for implementing these goals, including transportation projects
- *Rural Bikeway Plan* - identifies where bicycle infrastructure improvements are needed in locations that are within the RVARC service area, but outside of the Roanoke Valley Transportation Planning Organization (RVTPPO) service area
- *Partnership for a Livable Roanoke Valley Plan* - outlines numerous strategies to safeguard and improve quality of life in the Roanoke Valley, including transportation strategies

Roanoke Valley Transportation Planning Organization

The Metropolitan Planning Organization (MPO) for the Roanoke Valley is called the Roanoke Valley Transportation Planning Organization (RVTPPO). This organization is staffed by RVARC and includes elected representatives from the following localities:

- Bedford County
- Botetourt County

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- Montgomery County
- Roanoke County
- City of Roanoke
- City of Salem
- Town of Vinton
- Franklin County (ex-officio)

Representatives from other organizations include:

- Greater Roanoke Transit Company (Valley Metro)
- Virginia Department of Rail and Public Transportation (DRPT)
- Virginia Department of Transportation (VDOT)

The RVTPO is responsible for planning and budgeting federal transportation funding designated for the Census Urbanized Area, which is currently based upon the 2010 Census. Because the Roanoke Urbanized Area exceeded a population of 200,000 with the 2010 Census, Roanoke was designated a Transportation Management Area (TMA) by the U.S. Department of Transportation. This designation has resulted in the availability of additional transportation funding. The map on page 6-9 shows the areas in Roanoke County that are within the 2010 Census Urbanized Area and the RVTPO service area.

The RVTPO is responsible for the following documents and programs:

- Roanoke Valley Transportation Plan – long range Transportation Plan which is updated every five years
- Transportation Improvement Program – includes federal obligations for funded transportation projects over four years
- Traffic Congestion Management Process – considers and annually monitors congestion

- *Unified Planning Work Program* – annual transportation planning activities to be undertaken
- *Surface Transportation Block Grant Program* – annual federal funding that the RVTPO can allocate to selected projects
- *Carbon Reduction Program* - annual federal funding that the RVTPO can allocate to projects that reduce transportation emissions
- *Transportation Alternatives Program* – the RVTPO receives funding for this program which it can also allocate to applicants
- *SMART SCALE* – statewide program to prioritize transportation projects for funding over six years
- *Regional Pedestrian Vision Plan* – identifies where pedestrian infrastructure improvements are needed in the RVTPO service area
- *Bikeway Plan* – identifies where bicycle infrastructure improvements are needed in the RVTPO service area
- *Transit Vision Plan* – identifies opportunities for expanding Valley Metro bus service
- *Regional Study on Transportation Project Prioritization for Economic Development and Growth* – identifies transportation improvements which could help advance the region's economic development goals

Roanoke Valley Greenway Commission

The Roanoke Valley Greenway Commission is an advisory board that facilitates coordination and collaboration on greenways among its five member jurisdictions. The member jurisdictions are:

- Roanoke County
- Town of Vinton

- City of Roanoke
- City of Salem
- Botetourt County

The member jurisdictions each appoint two staff members and three citizens to the Greenway Commission, and RVTPO and Pathfinders for Greenways (detailed in next sub-section) each appoint one representative as well. In addition, RVARC, the Western Virginia Water Authority, Roanoke Regional Partnership, and Virginia Tourism Corporation provide one ex-officio (non-voting) member each.

Pathfinders for Greenways

Pathfinders for Greenways is a non-profit organization that was founded in 1997 for the purpose of involving citizens in the development of the Roanoke Valley greenway network. Pathfinders

for Greenways fulfills this purpose by facilitating volunteer participation, coordinating workdays, organizing promotional events, and raising funds. The organization has purchased and utilized over \$60,000 worth of trail building equipment over the years and facilitates 3,000-5,000 hours of volunteer service each year. The organization has proven to be particularly effective in constructing and maintaining natural surface trails.

Appalachian Trail Conservancy

The Appalachian Trail Conservancy (ATC) was created in 1925 to protect, maintain and celebrate the National Park Service's Appalachian National Scenic Trail (AT). The ATC works in partnership with local, state and federal agencies, to include the National Park Service and the U.S. Forest Service. An ATC office located in Roanoke City houses the Senior Regional Director for the South section of the AT and Central Virginia-focused staff.

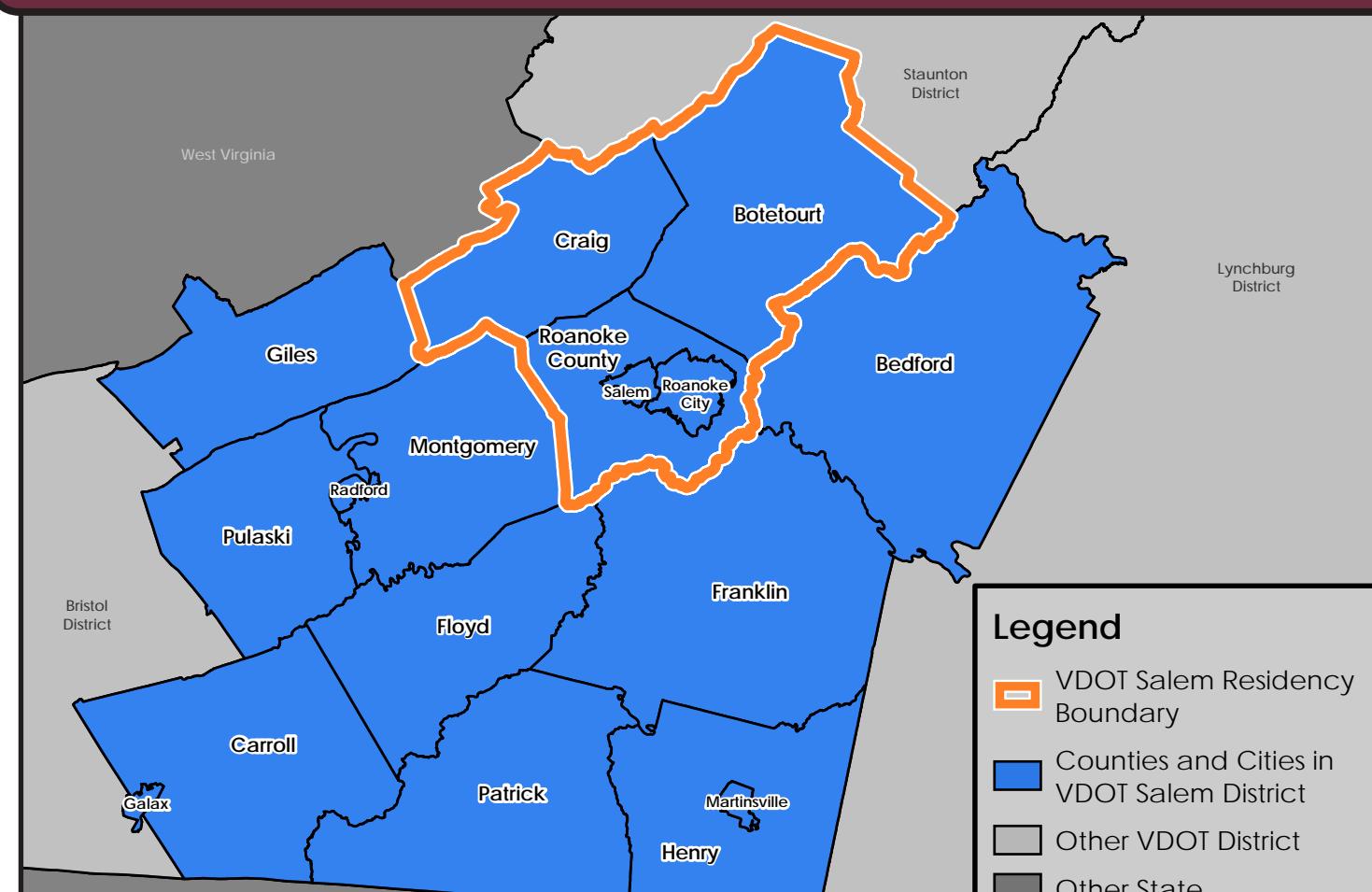




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VDOT Salem District & Salem Residency



VDOT Districts

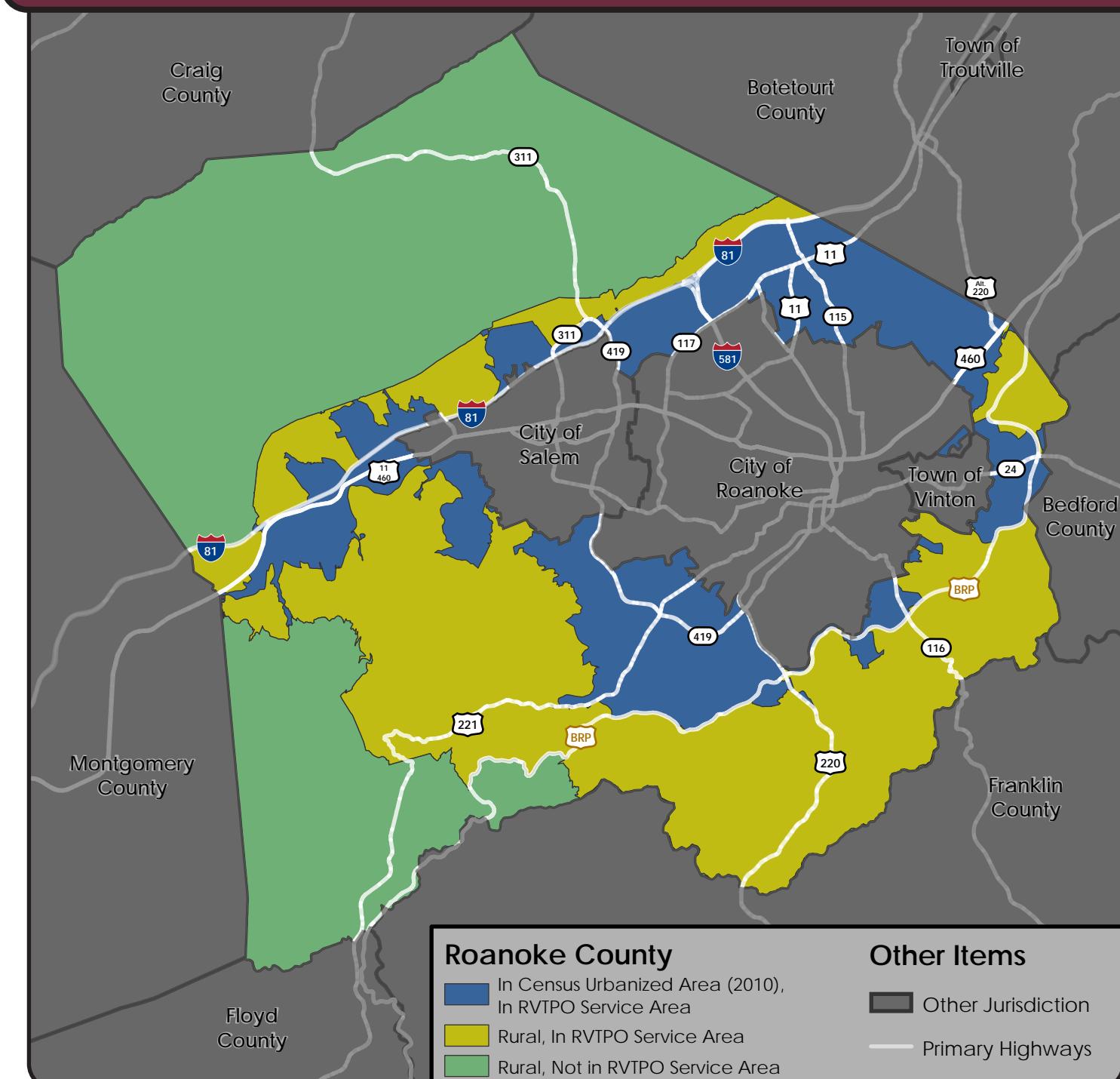
Credit: VDOT



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Census Urbanized Area & RVTPO Service Area



Other Items

- Other Jurisdiction
- Primary Highways

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Roanoke Appalachian Trail Club

The Roanoke Appalachian Trail Club (RATC) was established in 1932 as a volunteer organization to explore, maintain and protect 120 miles of the AT in the Roanoke area. Designated the McAfee Knob Task Force, one RATC task is to patrol the McAfee Knob, Dragon's Tooth and Tinker Cliffs sections of the AT.

Roanoke Regional Airport Commission

The Roanoke Regional Airport Commission is an independent subdivision of the Commonwealth of Virginia that owns and operates the Roanoke-Blacksburg Regional Airport (ROA). Roanoke City Council appoints four representatives to the Airport Commission, the Roanoke County Board of Supervisors appoints two representatives, and Salem City Council appoints one representative. The Airport Commission is financially independent from the localities of the Roanoke Valley and

receives no local tax revenue.

Roanoke County Planning Commission and Board of Supervisors

The Roanoke County Board of Supervisors sets priorities for County transportation projects. The first step in determining project priorities is identifying areas of Roanoke County to study. Planning staff typically lead these studies in partnership with other departments like Economic Development, Administration, and/or Parks, Recreation and Tourism. Public engagement is critical and opportunities for community feedback occur throughout the study. Implementation strategies, which could include proposed transportation projects, are included in the draft study.

The Roanoke County Planning Commission is an advisory board to the Board of Supervisors. The Planning Commission works closely with Planning staff throughout the course of all studies. When

complete, the Planning Commission holds a public hearing on the draft study to make a recommendation to the Board of Supervisors. Another public hearing is held with the Board of Supervisors to consider adoption of the study as part of a County plan.

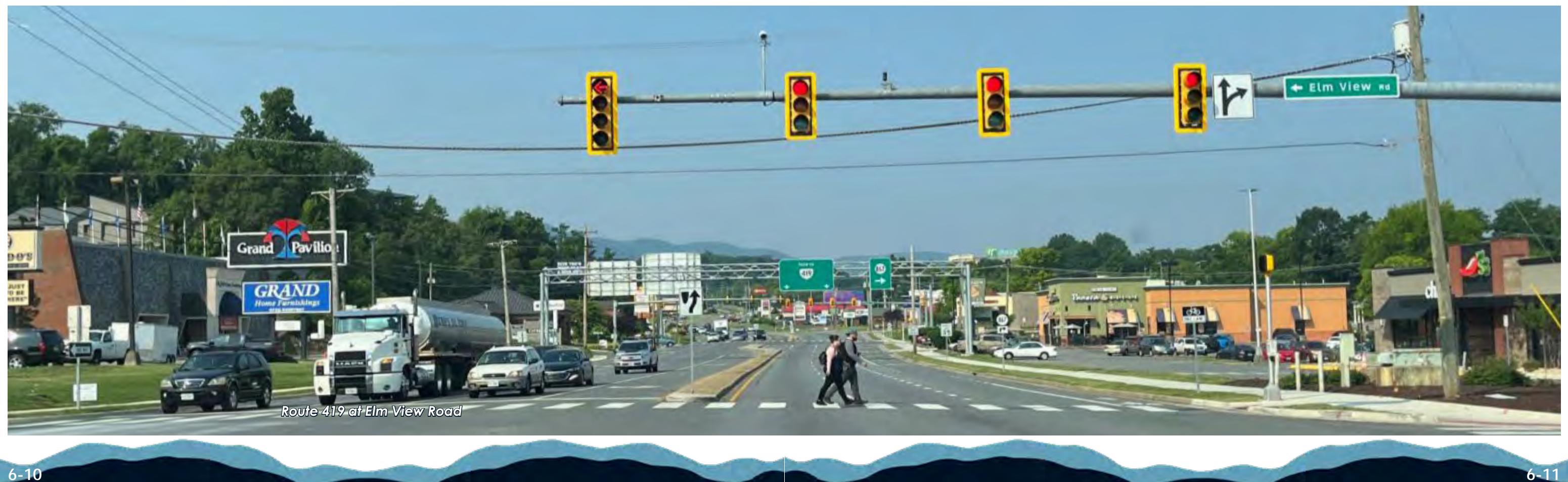
When the study is complete, staff will identify which implementation strategies could be started first. With Board of Supervisors concurrence, additional studies may be funded to determine conceptual plans and estimates for submission as grant applications. For several grant programs, resolutions of support are obtained from the Roanoke County Board of Supervisors as part of the grant application, particularly if County match funding is proposed.

For Roanoke County-administered projects, the Board of Supervisors needs to adopt ordinances to accept and appropriate grant funds prior to a project beginning and if additional funding is added to the project from other agencies.

6.3 Plans & Studies

 The plans discussed in this section were not drafted by Roanoke County, but each plan has contributed to the development of the Roanoke County transportation system, and each continues to do so. The recommendations included in these plans influence Roanoke County's selection and prioritization of projects, and inclusion as a recommendation in one or more of these plans greatly enhances a project's chances of receiving grant funding.

Once a plan is in place, the next step is often to undertake one or more studies to examine high-priority plan recommendations in greater detail and narrow down potential locations for projects. Some studies include early-stage project design. The studies discussed in this section, beginning with Arterial Preservation Program Studies on page 6-16, are in various stages of completion. Some



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have not yet been completed, while others were completed years ago. Roanoke County, VDOT, and RVTPO all undertake studies that advance Roanoke County transportation projects.

Roanoke Valley Transportation Plan

Prepared and adopted by the RVTPO with significant input from localities, the Roanoke Valley Transportation Plan serves as the federally required Long Range Transportation Plan (LRTP) for the RVTPO service area. The latest version of the Roanoke Valley Transportation Plan was adopted in 2023, with a plan horizon of 2045. This plan outlines regional transportation needs and priorities and serves as the foundation for the development of the RVTPO's Transportation Improvement Program (TIP). The Roanoke Valley Transportation Plan also includes a list of all transportation projects currently funded in the RVTPO service area, and a list of short-term and long-term priority projects for localities and public agencies to pursue in the future.

Regional Pedestrian Vision Plan

RVTPO's 2015 Regional Pedestrian Vision Plan



Plantation Road Shared Use Path

provides a coordinated and strategic approach for advancing walking as a means of transportation in the Roanoke Valley. This plan identifies where pedestrian infrastructure is most needed in the RVTPO service area based on the potential for residents, employees, shoppers, diners, and other visitors to access nearby destinations.

Bikeway Plan for the Roanoke Valley Area Metropolitan Planning Organization

The 2012 Bikeway Plan was prepared and adopted by the Roanoke Valley Area Metropolitan Planning Organization (RVAMPO), the precursor to RVTPO. This plan provides a coordinated and strategic approach to developing a regional bicycle network in the RVTPO service area. The Bikeway Plan provides recommendations for bicycle infrastructure that would advance bicycling as a means of transportation in the Roanoke Valley by enhancing connectivity between activity centers, cultural resources, and other points of interest.

Rural Bikeway Plan

The 2020 Rural Bikeway Plan was prepared and adopted by RVARC, as RVTPO only serves the



Sidewalk on Williamson Road

urbanized area of the Roanoke Valley. This plan identifies bicycle infrastructure improvements for localities to consider in the rural parts of the RVARC service area. The Rural Bikeway Plan also identifies why people bicycle in these rural areas, where exactly they are bicycling, and the quality of existing bicycle facilities.

Roanoke Valley Greenway Plan

The Roanoke Valley Greenway Plan sets the foundation for greenway development in the Roanoke Valley by providing coordinated recommendations for greenway projects across the five member jurisdictions of the Roanoke Valley Greenway Commission. The Greenway Plan is developed by the Roanoke Valley Greenway Commission in conjunction with its member jurisdictions. The Roanoke Valley Greenway Plan is a ten-year plan, and it has been updated roughly every ten years since the first iteration of the plan was published in 1995. An update was published in 2007, and the most recent iteration was published in 2018. The Greenway Commission is currently working on a five-year update to the Greenway Plan, which is anticipated to be finalized in 2024. The Roanoke Valley Greenway Plan has been

adopted as a component of the Roanoke County Comprehensive Plan by the Roanoke County Board of Supervisors.

Roanoke Valley Transit Vision Plan

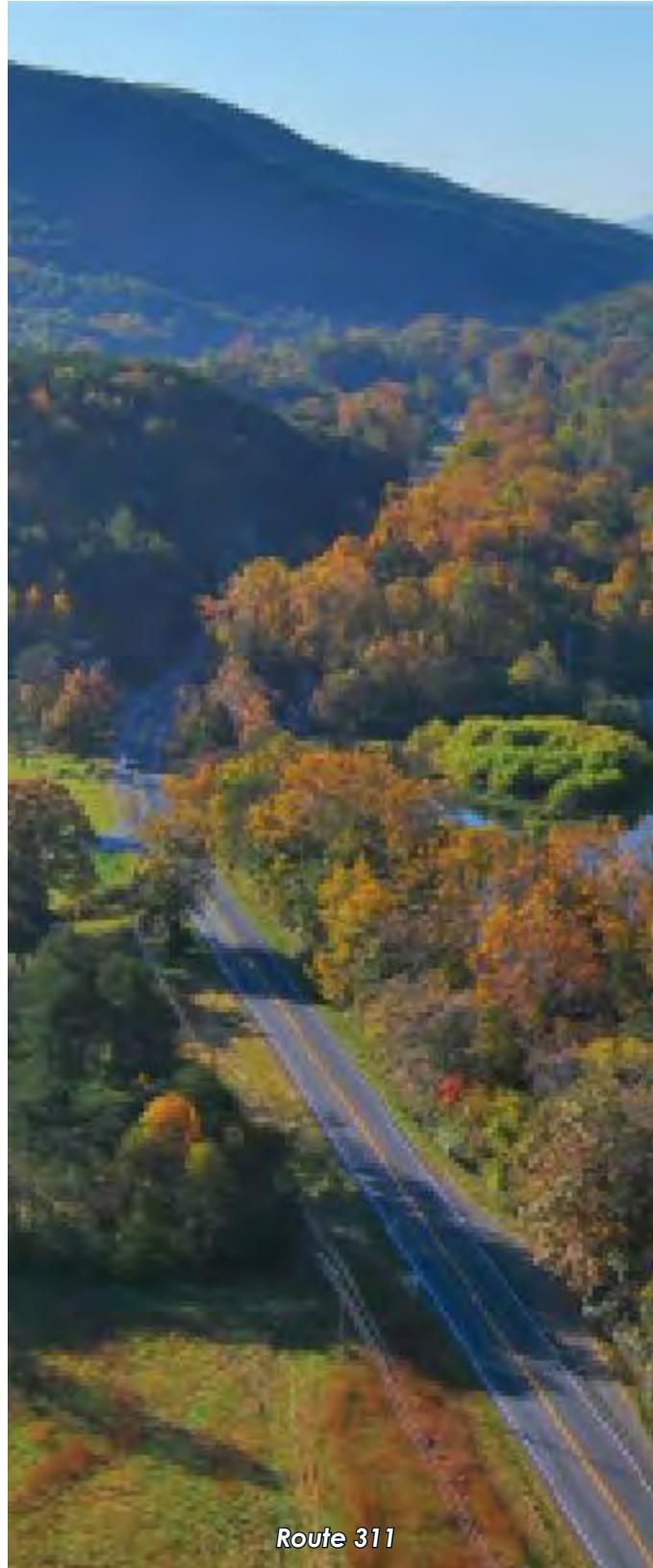
RVTPO's 2016 Roanoke Valley Transit Vision Plan provides a roadmap for expanding and improving transit service in the Roanoke Valley. This plan provides short-term (2016-2022), medium-term (2022-2030), and long-term (2030-2040) recommendations for extending bus routes, increasing service frequency on existing routes, and adding new routes.

Traffic Congestion Management Process

The designation of the Roanoke Urbanized Area as a Transportation Management Area (TMA) following the 2010 Census brought with it the requirement that the RVTPO produce a congestion management process (CMP) for the Roanoke Urbanized Area. The Traffic Congestion Management Process, first published in 2014 and updated in 2020, serves as the CMP for the RVTPO service area and identifies priority corridors for congestion management activities as well as



Valley Metro buses at Tanglewood Mall



strategies to reduce and mitigate congestion in the RVTPO service area.

Partnership for a Livable Roanoke Valley Plan

The 2014 Partnership for a Livable Roanoke Valley Plan outlines numerous strategies to safeguard and improve quality of life in the Roanoke Valley. This plan focuses on promoting economic development, workforce development, health, and natural assets, and many transportation strategies are recommended to advance the region's progress in these areas. The Partnership for a Livable Roanoke Valley Plan was facilitated by RVARC.

Roanoke Valley-Alleghany Regional Comprehensive Economic Development Strategy

A Comprehensive Economic Development Strategy (CEDS) is a prerequisite for a region to be designated an Economic Development District (EDD) by the U.S. Economic Development Administration (EDA). EDD designation enhances the ability of regional entities and localities to obtain grants from the EDA. The Roanoke Valley-Alleghany Regional Comprehensive Economic Development Strategy is the CEDS for the RVARC service area, and is updated and adopted annually by RVARC. This document provides an economic roadmap for the RVARC service area by assessing the regional economy, establishing regional goals and objectives, and outlining an action plan of priority projects (including transportation projects) to advance these goals and objectives. In 2017, the EDA designated the RVARC service area as an EDD.

Regional Study on Transportation Project Prioritization for Economic Development and Growth

In 2018, the RVTPO prepared and adopted the Regional Study on Transportation Project Prioritization for Economic Development and Growth to identify how the region's economic vitality can be supported through transportation

projects. The 2018 Regional Study on Transportation Project Prioritization for Economic Development and Growth provided a high-level overview of the regional economy and identified transportation projects that could help advance the region's economic priorities. In 2021, the Regional Study on Transportation Project Prioritization for Economic Development and Growth was updated, with a greater focus on engaging local businesses and economic development stakeholders, and a new list of transportation project recommendations.

Botetourt County, Roanoke County, and Town of Vinton Comprehensive Safety Action Plan

In January 2023, Roanoke County, Botetourt County, and the Town of Vinton were awarded planning funds through the Safe Streets and Roads for All Grant Program (SS4A) to create a joint Comprehensive Safety Action Plan covering those three jurisdictions.

This planning process will run through 2024 and will include three phases:

- An analysis of crashes over the previous five or more years that have resulted in a fatality or serious injury, the modes of transportation involved in these crashes, and the demographic characteristics of the people involved in these crashes. This will inform the identification of a "high-injury network" spanning all three jurisdictions
- Feedback gathered during a public outreach process will be considered, along with the high-injury network, to develop a prioritized and comprehensive set of recommendations for each locality. These recommendations will consist of projects, strategies, and policies
- Conceptual design plans and cost estimates will be produced for each locality's highest priority project

SS4A offers implementation grants for projects included in Comprehensive Safety Action Plans. Roanoke County will seek implementation

grants to construct projects recommended in the Comprehensive Safety Action Plan once it is complete.

Interstate 81 Corridor Improvement Plan

In 2018, the CTB adopted the Interstate 81 (I-81) Corridor Improvement Plan, a joint effort between OIPI, VDOT, and DRPT to identify improvements to address the delays that have become increasingly common on I-81 as traffic, especially tractor trailer traffic, has increased over time. The plan identifies recommendations of capital improvements to be funded in the next ten years. All the segments of I-81 in Roanoke County for which an additional lane had not yet been funded were recommended for additional lanes in the plan, except for southbound I-81 between Exit 128 (in Montgomery County) and Exit 137. All the segments of I-81 in Roanoke County for which an additional lane was recommended in the I-81 Corridor Improvement Plan have since been funded through the I-81 Corridor Improvement Fund that was created in 2019 to fund projects recommended in the plan. Per § 33.2-3604 of the Code of Virginia, the CTB must "regularly" update the plan.

Roanoke-Blacksburg Regional Airport Master Plan

In 2019, the Roanoke Regional Airport Commission initiated an update of the Roanoke-Blacksburg Regional Airport (ROA) Master Plan, the first update to the Airport Master Plan since 2008. The Airport Master Plan evaluates and determines ROA's long-term needs and development plans for the next twenty years. The Airport Master Plan is necessary to prepare the airport for anticipated increases in demand for commercial passenger flights, air cargo, and general aviation, and for the emergence of new technologies. The Airport Master Plan also examines opportunities to support other economic and development uses at ROA.

The Airport Master Plan was approved by the Roanoke Regional Airport Commission in July 2023 and submitted to the Federal Aviation Administration (FAA) and Virginia Department of Aviation (DOAV) for final approval. FAA and

DOAV are expected to reach a determination by Spring 2024. The draft Airport Master Plan includes five potential alternatives for extending runways, two of which would extend into Roanoke County (over Peters Creek Road or over Dent Road). The draft Airport Master Plan also recommends the construction of four "vertiports" at ROA to serve Electric Vertical Takeoff and Landing Aircraft (eVTOLs), an emerging technology that is discussed on pages 6-71 and 6-72.

VTrans

VTrans is Virginia's statewide transportation plan, prepared on behalf of the CTB by OIPI. This plan lays out the overarching vision and goals for transportation within the Commonwealth and outlines strategies for realizing these goals. VTrans includes two planning horizons - Mid-Term (0-10 years) and Long-Term (20+ years) - and utilizes different approaches for these two planning horizons.

For the Mid-Term planning horizon, VTrans identifies needs in specific locations within three travel markets - Regional Networks (see pages 6-38 and 6-39), Corridors of Statewide Significance (see pages 6-40 through 6-42), and Urban Development Areas (called Designated Growth Areas in Roanoke County) - as well as priority locations to focus on in these travel markets. For the Long-Term planning horizon, VTrans identifies megatrends, or powerful and transformative forces, and macrotrends, or emerging patterns of change, that are anticipated to influence transportation throughout the Commonwealth, as well as a register of risks and opportunities relating to these megatrends and macrotrends. VTrans is updated at least once every four years, and the most recent update was adopted by the CTB in 2021.

Arterial Preservation Program Studies

VDOT initiated the Arterial Preservation Program to improve the capacity and safety of roadways that are part of the Arterial Preservation Network. In the Roanoke region, roadways in the Network are Route 220 and Route 460.



The U.S. 220 Arterial Preservation Program Study began in Fall 2017. The section of U.S. 220 studied started at U.S. 220 Business (Franklin Road in the City of Roanoke) to the North Carolina state line, a distance of about 43 miles. Consultants reviewed locality, regional and statewide studies relevant to the corridor, evaluated existing conditions including crash locations and types of crashes. Safety improvement recommendations were generated with an emphasis on utilizing Innovative Intersections, which are concepts that change traffic movements to improve safety, reduce delay and increase efficiency. It was determined that because of the high traffic volumes and high crash rates between U.S. 220 Business/Franklin Road and Indian Grave Road/Clearbrook Village Lane that an additional study would be undertaken to look at the northern portion of the corridor in Roanoke County and the City of Roanoke. This study was undertaken as a means to implement a portion of an Interstate 73 Earmark intended to improve access management along the Route 220 corridor between the Martinsville Bypass and Interstate 581 in Roanoke. Eight traffic signals were identified for modifications to reduce one traffic signal phase from four phases to three. This change in the traffic signal to a Through-Cut configuration prohibits through movements from side street to side street, and instead requires a right or left turn and either a u-turn at the next opportunity or a turn into a different roadway or entrance to access the destination. The Through-Cut reduces congestion, improves safety, minimizes impacts to businesses by rerouting a very small percentage of traffic and is cost effective. Four intersections along Route 220 in the City of Roanoke and Roanoke County are funded through this earmark for construction in 2024:

- Valley Avenue/Southern Hills Drive
- Crossbow Circle/Pheasant Ridge Road
- Buck Mountain Road/Stable Road
- Indian Grave Road/Clearbrook Village Lane

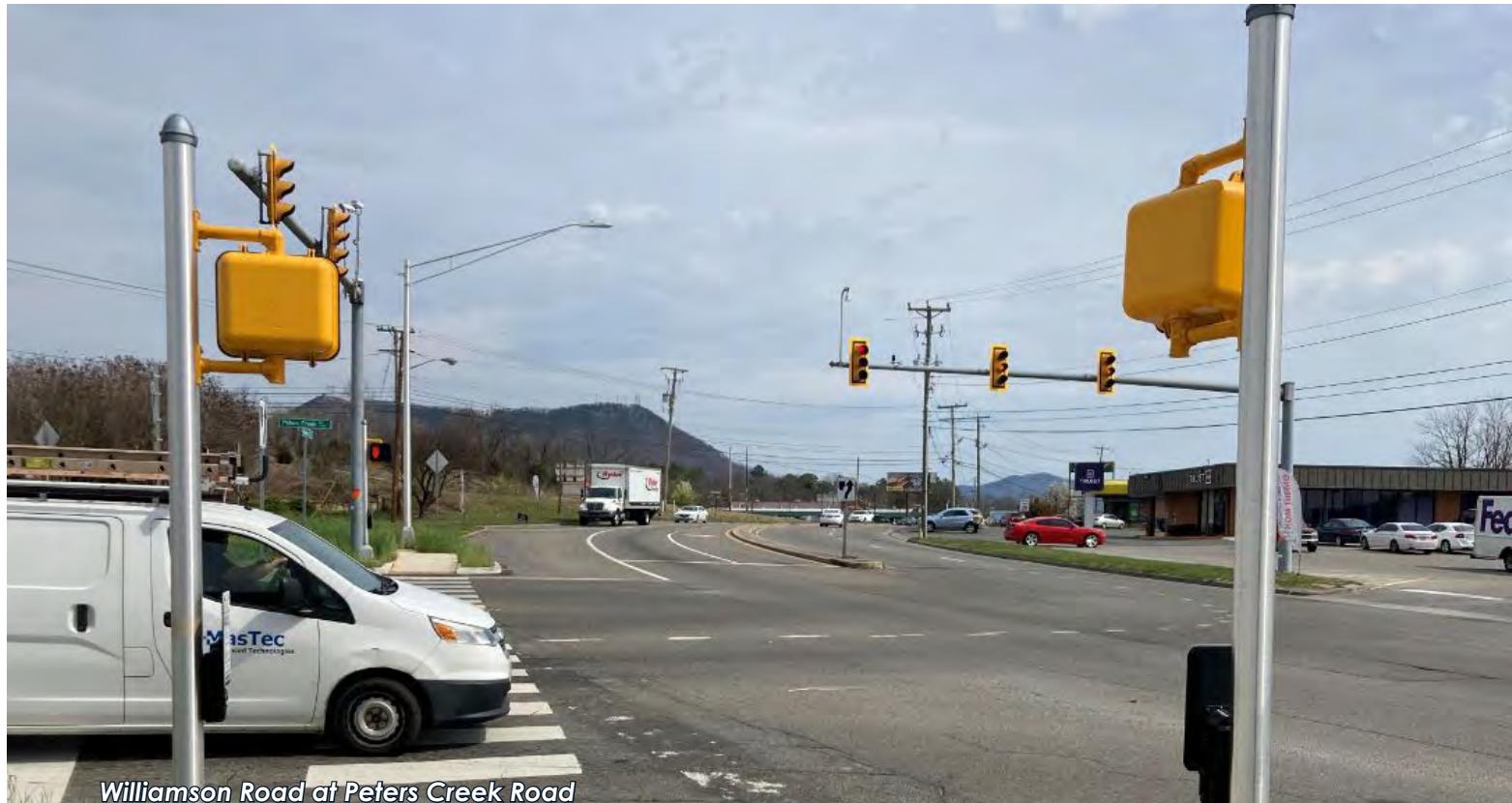
The U.S. 460 Arterial Preservation Program Study also began in Fall 2017. The extent of the corridor

studied began at Interstate 81 in Botetourt County on Route 220 Alternate and continued along Route 460 to Nottoway County. Consultants again studied existing plans and existing conditions. The Route 460/Challenger Avenue signalized intersection at Route 220 Alternate/Cloverdale Road showed the highest number of crashes on the corridor. Several recommendations were proposed to improve safety at this intersection. The preferred recommendation, a Displaced Left-Turn, was carried over to and included within a Strategically Targeted Affordable Roadway Solutions (STARS) Route 460 Corridor Improvement Study.

Strategically Targeted Affordable Roadway Solutions

The Strategically Targeted Affordable Roadway Solutions Program (STARS) was launched by VDOT in 2007 to support the development of affordable and short-range projects to address congestion bottlenecks and safety issues throughout the Commonwealth of Virginia. In the aftermath of the Great Recession, the program's focus shifted to developing corridor studies and conceptual design plans to address more complex congestion and safety issues with innovative, affordable long-term solutions. This remains the focus of the program today, as funding for transportation projects has still not returned to pre-Recession levels (adjusted for inflation), putting complex widening and capacity expansion projects out of reach for most localities. On top of reduced funding availability, high inflation in the wake of the COVID-19 pandemic has led to dramatic increases in project costs, further necessitating the availability of innovative, affordable solutions to address critical traffic and safety challenges.

One STARS study has been completed in Roanoke County in the past five years, the Route 460 (Orange Avenue/ Challenger Avenue) Corridor Improvement Study. This study began in September 2019 and built upon recommendations included in the U.S. 460 Arterial Preservation Program Study. The corridor studied extended from Williamson Road/Route 11 in the City of Roanoke to Cloverdale



Road/Route 220 Alternate in Roanoke County. An existing conditions analysis showed many high crash intersections. A survey was conducted along with an in-person community meeting in November 2019. Intersection alternatives were presented to the localities and to the public at a June 2020 virtual meeting. Seven projects were ultimately chosen for submission into the SMART SCALE program. Five of the seven projects were funded with two located in Roanoke County (these two projects have since been combined into one project):

- Route 460 at West Ruritan Road Intersection Improvements
- Route 460 Intersection Improvements from Carson Road to Huntridge Road

A third STARS-recommended project in Roanoke County, Route 460/Challenger Avenue and Alternate Route 220 Intersection Improvements,

was funded by the CTB with surplus funding in December 2021.

Project Pipeline Studies

Project Pipeline is a performance-based planning program that was launched in 2021 with the goal of identifying cost-effective solutions to VTrans-identified transportation needs in VTrans-identified priority locations. The program is a collaborative effort between OIPI, VDOT, and DRPT. Project Pipeline is modeled on STARS, but with a focus on implementing VTrans. The vision for the program is that it will conduct efficient studies that will provide state funding programs with a steady stream, or "pipeline," of well-developed projects that address the statewide transportation priorities laid out in VTrans.

Roanoke County requested and VDOT initiated a Project Pipeline Initiative study along Route 419 between the City of Salem and Bower Road in

2021 because the corridor includes VTrans Priority Level 2 Needs. This corridor also coincides with Route 419 intersection concerns identified by area residents and businesses as part of the Oak Grove Center Plan. Consultants completed an existing conditions analysis and needs identification, followed by build alternatives analysis. A survey was conducted in March 2022 which helped to identify which projects would be submitted for SMART SCALE funding. Roanoke County assembled two applications comprising several Innovative Intersection modifications and sidewalks. One project located between Stoneybrook Drive and Grandin Road Extension has been funded. The study concluded with the publication of a final report in December 2022.

In May 2023, VDOT initiated two new Project Pipeline studies in Roanoke County: One for Peters Creek Road and Williamson Road between Wood Haven Road and Plantation Road, and another for the Route 11/460/West Main Street at Dow Hollow Road intersection. The purpose of the Peters Creek Road and Williamson Road study is to identify project recommendations that would improve roadway safety, reliability, and multimodal accessibility and connectivity, and address transportation demand management needs. The purpose of the Route 11/460/West Main Street at Dow Hollow Road intersection study is to identify project recommendations that would improve roadway safety while preserving capacity. Public outreach for these studies concluded in Spring 2024, and it is anticipated that both studies will be finalized in Summer 2024. Their recommendations will be submitted for SMART SCALE Round 6 applications in 2024.

West Roanoke River Greenway Feasibility Study

In Spring 2022, Roanoke County applied for and was awarded technical assistance through the National Park Service Rivers Trails, and Conservation Assistance Program (NPS-RTCA) to study potential routes for the Roanoke River between Green Hill Park and Montgomery County. The West Roanoke River Greenway Feasibility Study began in Summer 2022. In October 2022, the first round of public

outreach was held, consisting of two community meetings and survey. In the first round of public outreach, participants identified how often they use greenways and how they use them, gave feedback on potential greenway amenities, identified destinations they'd like to see the greenway connect to, and noted how close they would like the greenway to be to their property.

A second round of public outreach was held in Summer 2023, consisting again of two community meetings and a survey. This time, participants gave feedback on conceptual routes for the greenway. As of October 2023, Roanoke County and NPS-RTCA staff are working to draft the West Roanoke River Greenway Feasibility Study document, which will contain multiple potentially viable routes for the Roanoke River Greenway between Green Hill Park and Montgomery County.

East Roanoke River Greenway Feasibility Study

In June 2023, The Roanoke County Board of Supervisors approved the County's budget for Fiscal Year 2024, which included funding to study potential routes for the Roanoke River Greenway between the City of Roanoke and the newly-completed 0.4-mile section of the Roanoke River Greenway just west of the Blue Ridge Parkway. This study will start in 2024.

Other Studies

VDOT initiated the Route 11/460 Corridor Study in 2013 between Technology Drive in Roanoke County and Interstate 81 Exit 118 in the Town of Christiansburg. The study analyzed existing conditions for vehicles, bicycles and pedestrians, determined a long-term vision for the corridor and provided recommendations for future improvements. Short-term, mid-term and long-term recommendations are included and have provided a foundation for additional studies along the corridor. The intersection at Route 11/460/West Main Street at Dow Hollow Road near Interstate 81 Exit 132 continues to have a high number of crashes and is under investigation by

VDOT and the county for potential improvements.

VDOT assisted Roanoke County in its efforts to improve Plantation Road between Interstate 81 and Route 11/Williamson Road by initiating a Plantation Road Corridor Study. The study was completed in May 2012 and included recommendations for pedestrian crosswalks, pedestrian and bicycle accommodations, and opportunities for landscaped medians. Most importantly, a traffic signal warrants analysis indicated that a traffic signal could be warranted at the Plantation Road/Lila Drive intersection.

The Roanoke Valley Area Metropolitan Planning Organization partnered with VDOT on a study of the entirety of Route 419 in 2010. The Route 419 Corridor Study is a multimodal transportation plan for the 9.5-mile-long corridor between Interstate 81 and U.S. 220 and involved the City of Salem, City of Roanoke and Roanoke County. The study included two public meetings, a review of existing conditions including crash analysis and a number of specific multimodal recommendations for intersections along the corridor. The Route 419 Corridor Study has proven to be a valuable reference that has been utilized for every Route 419 grant application submitted since the study's completion.

6.4 Changes since the 2005 Comprehensive Plan

 The 2005 Comprehensive Plan included recommendations to add lanes to all primary routes and several secondary routes in Roanoke County. This is no longer feasible due to cuts to transportation project funding during the recession that began in 2008, changes in the priorities of funding programs, and a dramatic increase in the cost of constructing transportation projects. With several new transportation funding sources available over the last decade, additional staff and resources have been dedicated to scope, request funding, design and construct a variety of transportation projects.

6.5 Roads



Roanoke County and VDOT are constantly working to keep motorists safe and traffic flowing smoothly. VDOT owns, operates, and maintains the roads in Roanoke County, but both Roanoke County and VDOT analyze data and conduct research and public outreach to plan projects that address issues faced by Roanoke County roads.

Using Data to Improve Safety

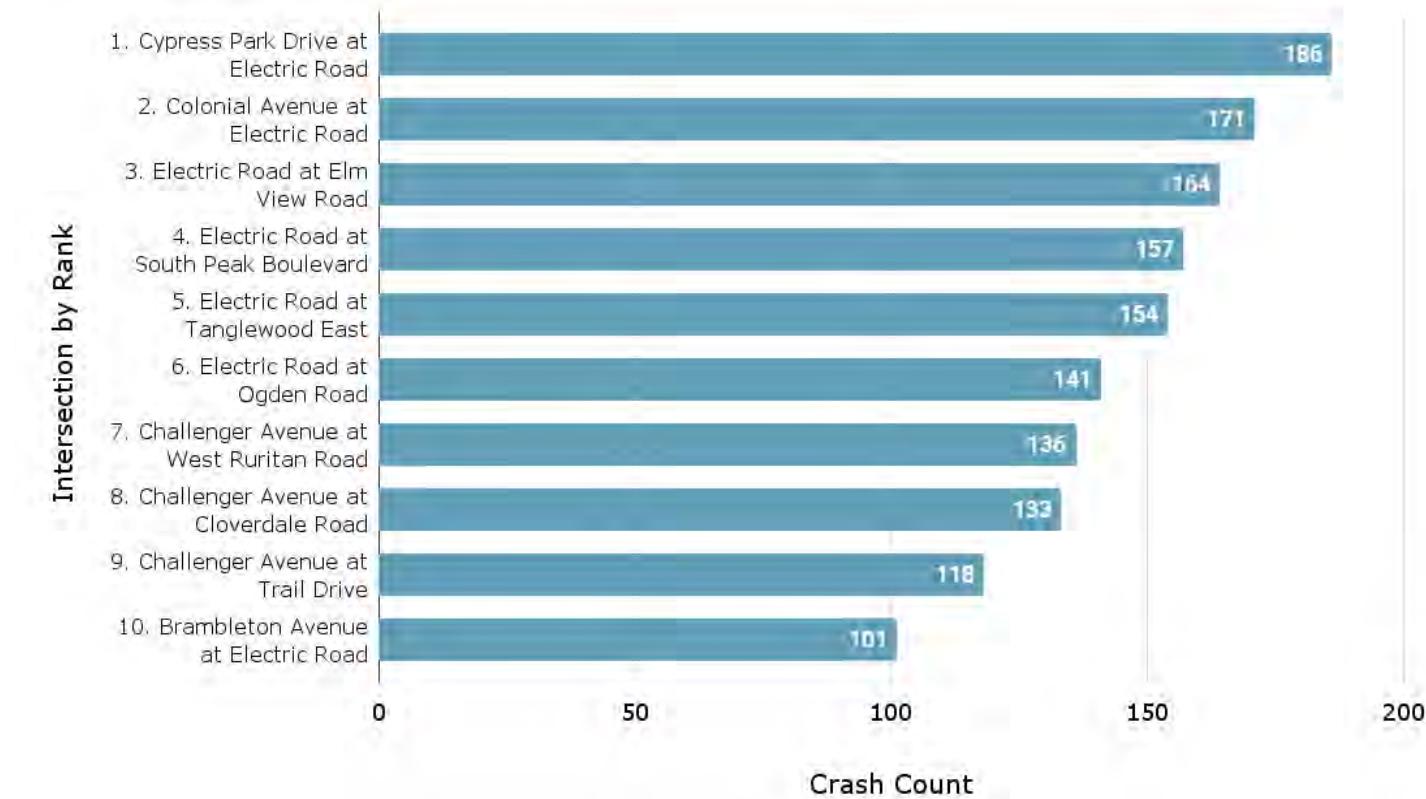
Roadways are used by every citizen in the County and roadway safety is of paramount importance. Safety is typically the most important factor when considering new roadway projects. Both VDOT and Roanoke County Police track crash data which provides invaluable information to determine which roadway segments and intersections should

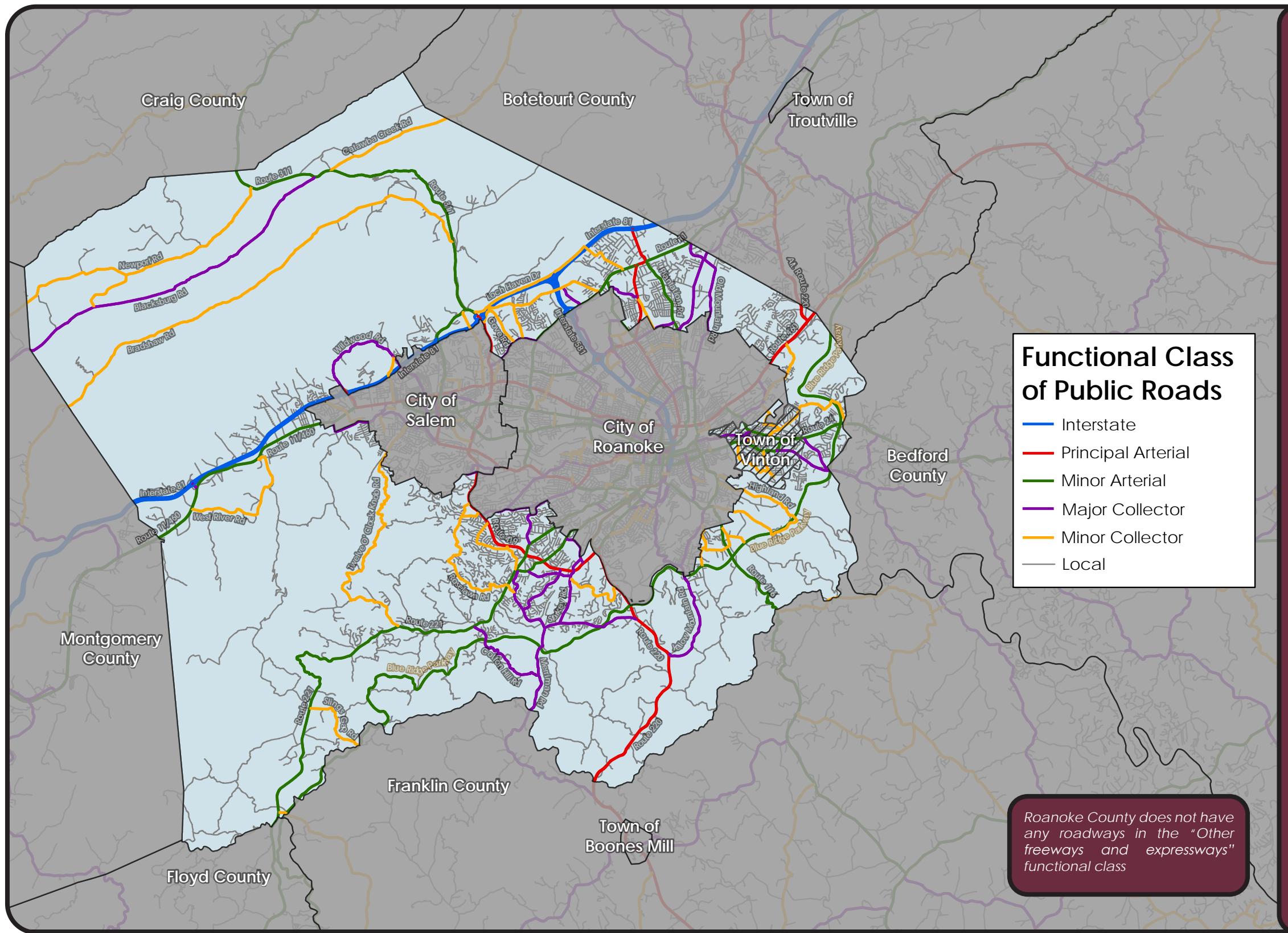
be analyzed for potential safety improvements. For instance, the chart on this page shows the ten intersections with the highest crash counts in Roanoke County. The ability to collect this information for specific locations around the County helps the Board of Supervisors to make informed decisions on where limited funds should be focused.

This data can also help determine the effectiveness of new roadway projects. For instance, Route 419 between Starkey Road and Route 220 is the busiest corridor in Roanoke County. Significant crash data has been documented at most intersections throughout this corridor. Roanoke County applied for and was awarded SMART SCALE funding for the Route 419 Widening, Safety and Multimodal Improvements project between Route 220 and Ogden Road in 2016. VDOT constructed the project in 2020 and 2021.

Intersection Crash Counts in Roanoke County

January 2015 - June 2022





Functional Classification of Roadways

Functional classification is the grouping of streets and highways into classes based on the character of service they are intended to provide. Roadways are grouped into one of seven functional classes, which are shown below in descending order from highest intensity of use to lowest intensity of use:

- Interstates
- Other freeways and expressways
- Other principal arterials
- Minor arterials
- Major collector
- Minor collector
- Local

Since the passage of the Federal Aid Highway Act of 1973, all states have been required to group all of their roads that are eligible for federal funding into the seven classes outlined above. The Federal Highway Administration (FHWA) provides uniform guidelines for functional classification to the states, so that there is consistency across state boundaries. In Virginia, functional classification is determined by VDOT's Transportation and Mobility Planning Division (TMPD).

A roadway's functional class determines its geometric design standards and maintenance requirements. Eligibility for federal funding and for traffic calming are also determined by a roadway's functional class.

The table on the following two pages details the functional class and length of every segment of roadway in Roanoke County classified something other than "local," and is color coded to the map on this page.



TRANSPORTATION



TRANSPORTATION

Functional Class of Roanoke County Roads

Interstates		
Route #	Road Name	Length in Roanoke County (Miles)
81	Interstate 81	15.65
581	Interstate 581	1.25
Total Interstate Miles in Roanoke County		16.9

Principal Arterials		
Route #	Road Name	Length in Roanoke County (Miles)
11	Williamson Road	1.9
112	Wildwood Road	0.24
115	Plantation Road	1.03
220	Franklin Road	6.45
220-Alt	Cloverdale Road	0.53
419	Electric Road / North Electric Road	6.58
460	Challenger Avenue	1.88
Total Principal Arterial Miles in Roanoke County		18.61

Minor Arterials		
Route #	Road Name	Length in Roanoke County (Miles)
11	Williamson Road	1.3
11/460	West Main Street	5.82
24	Washington Avenue	1.25
48	Blue Ridge Parkway	24.42
115	Plantation Road	2.17
116	Jae Valley Road	3.22
117	Peters Creek Road	1.39
118	Airport Road	0.21
221	Bent Mountain Road / Brambleton Avenue	14.5
311	Thompson Memorial Drive / Catawba Valley Drive	10.95
419	North Electric Road	0.34
687	Penn Forest Boulevard	0.34
720	Colonial Avenue	1.87
Total Minor Arterial Miles in Roanoke County		67.78

Major Collectors		
Route #	Road Name	Length in Roanoke County (Miles)
601	Hollins Road / Shadwell Drive	2.84
605	Old Mountain Road / Shadwell Dr. / Sanderson Drive	2.36
613	Merriman Road	4.69
619	Wildwood Road	3.22
623	Dent Road	0.85
625	Hershberger Road	0.6
627	Shadwell Drive	0.03
634	Hardy Road	0.98
639	West Riverside Drive	0.98
647	Dow Hollow Road	0.23
654	Feather Road	1.14
668	Yellow Mountain Road	2.9
679	Buck Mountain Road	2.23
681	Ogden Road	0.19
682	Garst Mill Road	0.92
685	Keagy Road	0.33
687	Penn Forest Boulevard	1.24
688	Cotton Hill Road	2.72
760	Diuguids Lane	0.17
785	Blacksburg Road	9.58
800	Chapparral Drive	1.66
867	Ogden Road	0.21
904	Starkey Road	2.4
1947	Valleypointe Parkway	0.7
Total Major Collector Miles in Roanoke County		43.17
Minor Collectors		
Route #	Road Name	Length in Roanoke County (Miles)
602	Clover Hill Road	0.25
612	Poor Mountain Road / Barley Drive	3.31
617	Pitzer Road	0.57
618	Highland Road	1.89
622	Bradshaw Road	11.77
623	Florist Road	0.95

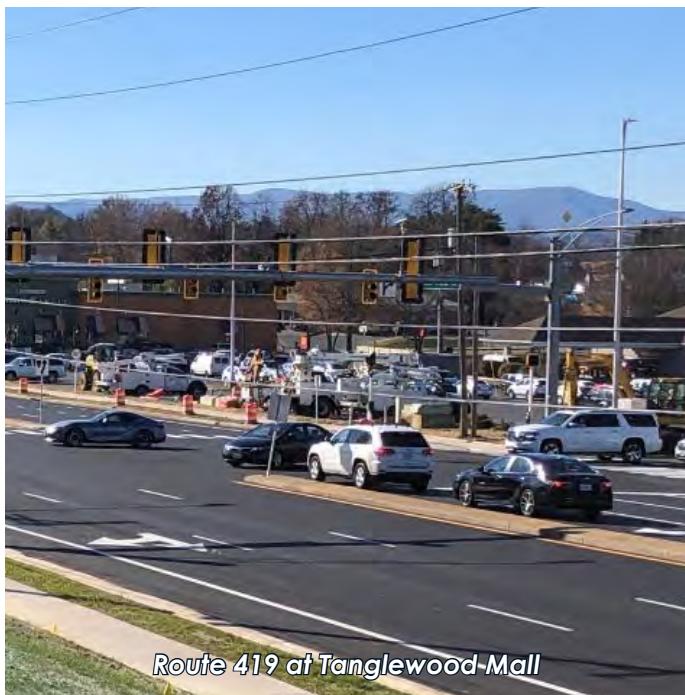
Minor Collectors cont'd		
Route #	Road Name	Length in Roanoke County (Miles)
624	Newport Road	7.69
628	Green Ridge Road / Wood Haven Road	3.37
629	Green Ridge Road	0.93
630	Kessler Mill Road	0.55
635	Goodwin Avenue	0.59
639	West River Road	2.86
651	Mountain View Road	1.87
658	Rutrough Road	2.15
659	Mayfield Drive	0.76
666	Bandy Road	0.97
681	Coopers Cove Road	0.12
685	Keagy Road	0.21
686	Grandin Road Extension	0.55
689	Roselawn Road	2.33
692	Sugar Loaf Mountain Road	1.93
694	Twelve O' Clock Knob Road	7.55
697	Sandyridge Road	1.53
702	Castle Rock Road	0.91
758	Carson Road	1.09
779	Catawba Creek Road	3.57
780	Cove Road	1.51
830	Technology Drive	0.07
864	Bradshaw Road	1.63
866	Ellington Street / Mount Pleasant Boulevard	0.56
907	Ranchcrest Drive	0.29
1316	Stoneybrook Drive	0.65
1541	Hunting Hills Drive	2.03
1662	McVitty Road	0.49
1663	Old Cave Spring Road	0.31
1832	Barrens Road / North Barrens Road	0.99
1836	Belle Haven Road	0.42
1894	Loch Haven Drive	3.6
Total Minor Collector Miles in Roanoke County		72.82

- **Before:** The location with the highest crash count, near the intersection of Ogden Road and the intersection of Cypress Park Drive, averaged about 50 crashes per year in 2018 through 2020.
- **After:** the same location dropped to 24 crashes in one year, between July 2021 and June 2022.

The Route 419 project addressed five of the top ten high-crash intersections in Roanoke County (Cypress Park Drive, Elm View Road, South Peak Boulevard, Tanglewood East Entrance Road and Ogden Road).

VDOT proposed and constructed a project at another location along Route 419 at Colonial Avenue. The project, which offset the Route 419 left turn lanes onto Colonial Avenue to improve sight distance for drivers turning left on the permissive yellow phase (flashing yellow arrow), was constructed in 2020. This project addressed the location with the second highest crash count in the County.

The three high-crash locations on Route 460/Challenger Avenue were analyzed as part of the



Route 460 (Orange Avenue/ Challenger Avenue) Corridor Improvement STARS Study completed in 2020. Three projects received SMART SCALE funding in 2021 and are currently in design:

- Route 460 at West Ruritan Road Intersection Improvements
- Route 460 Intersection Improvements from Carson Road to Huntridge Road
- Route 460/Challenger Avenue and Alternate Route 220 Intersection Improvements

The remaining top ten crash location is Route 419 at Route 221/Brambleton Avenue. The top ten crash locations will continue to change over time as safety improvements are constructed and as new traffic patterns emerge with new development.

Using Data to Improve Traffic Flow

VDOT maintains and annually updates two publicly available traffic volume datasets covering all VDOT roadways: Average Daily Traffic (ADT) and Annual Average Daily Traffic (AADT). Both metrics are useful for transportation planning and decision-making, and provide critical information for designing, maintaining, and improving transportation infrastructure to meet the needs of current and future traffic demands. ADT is the number of vehicle trips taken on a roadway over the course of any number of days, divided by that number of days. AADT is the number of vehicle trips taken on a roadway over the course of an entire year, divided by 365 days. AADT is considered the more reliable measurement of traffic volume and is more frequently cited than ADT.

The tables on pages 6-28 and 6-29 show the County's top ten highest-trafficked roadway segments according to the AADT data from 2019 and 2021. AADT data from 2019 was used in the existing conditions analysis for this plan. This is because traffic volumes in 2021 were still somewhat suppressed by the COVID-19 pandemic. It is anticipated that by the time of the adoption of this Plan, traffic volumes will have mostly returned to pre-pandemic levels.

The map on page 6-30 shows AADT for all Roanoke County roadways on which AADT was collected in 2019. However, since road projects are usually constructed multiple years after funding applications are submitted and will ideally serve vehicular traffic for decades into the future, VDOT also makes projections about future traffic volumes. The map on page 6-32 shows projected AADT for 2045.

Traffic volume figures like AADT provide a sense of the level of congestion on a roadway, but they do not tell the whole story. AADT is not calculated on a per-lane basis, so a road with multiple lanes may have much higher AADT than a road with one lane, but less congestion if it has fewer vehicles per lane than the one lane road. In addition, other factors like geometry and signal timing can contribute to congestion.

To measure the overall operating conditions of a roadway, Roanoke County and VDOT use a measurement called Level of Service (LOS). Level of Service analyzes a variety of factors, such as speed, travel time, maneuverability, delay, and safety, to assign each roadway segment a score of "A" through "F," with "A" indicating free-flow traffic and "F" indicating stop-and-go traffic. The map on page 6-31 shows VDOT's 2019 LOS calculations for Roanoke County roads. The map on page 6-33 shows projected LOS for 2045.

Roanoke County has intentionally focused its limited dollars on high-volume, low LOS roadway segments - Route 419 between Starkey Road and Route 220 (highest-volume non-Interstate segment, D Level of Service), and Route 460 between the City of Roanoke and Botetourt County (second highest-volume non-Interstate segment, C Level of Service) - to address congestion and safety issues on those roads.

Updating Outdated Infrastructure

There are a few areas in which roadways in Roanoke County are outdated and in need of update. Most arterial and collector routes in Roanoke County were designed either in the centuries before World War II, when the County was predominantly rural,

or in the first few decades following World War II, when the flatter areas of the County near the City of Roanoke were becoming suburban in character but had not been developed to anywhere near the degree that they are today. Some of the most important roadways in Roanoke County are struggling to accommodate the traffic generated by the development that has occurred in the years since they were designed. Roanoke County has pursued, and continues to pursue, innovative, cost-effective roadway improvements to reduce the congestion brought about by previous development, and keep traffic flowing smoothly as development continues.

Many of the roadways built in the county were built during a time of urban and suburban sprawl with only automobiles in mind. Over the last 20 years, County residents have increasingly requested accommodations for walking and bicycling. These alternative modes of transportation are now considered with most roadway projects.

Aging, unsafe bridges are a problem throughout the United States. In 2021, the average age of bridges on public roads in the United States was 45 years old, up from 42 years in 2003 (Hartman, 2021; Chase, et al, 2003). The 2023 National Bridge Inventory rated 6.8% of bridges in the United States and 3.5% of bridges in Virginia as "structurally deficient." Structurally deficient bridges are bridges that are closed to traffic or require reduced weight limits and/or significant maintenance or repair to remain open to traffic. These bridges usually require eventual rehabilitation or replacement to remain in service over the long term. Luckily, there are no structurally deficient bridges in Roanoke County, but this may change as Roanoke County's bridges age.

Upgrading and coordinating traffic control devices with newer technology has also shown significant benefits to increase traffic flow and safety. VDOT is also encouraging the integration of Innovative Intersections, like roundabouts, to improve roadway safety. The roundabout completed in 2022 at the intersection of Route 311 and Route 419 has dramatically improved travel times by eliminating the traffic signal at that intersection.



TRANSPORTATION



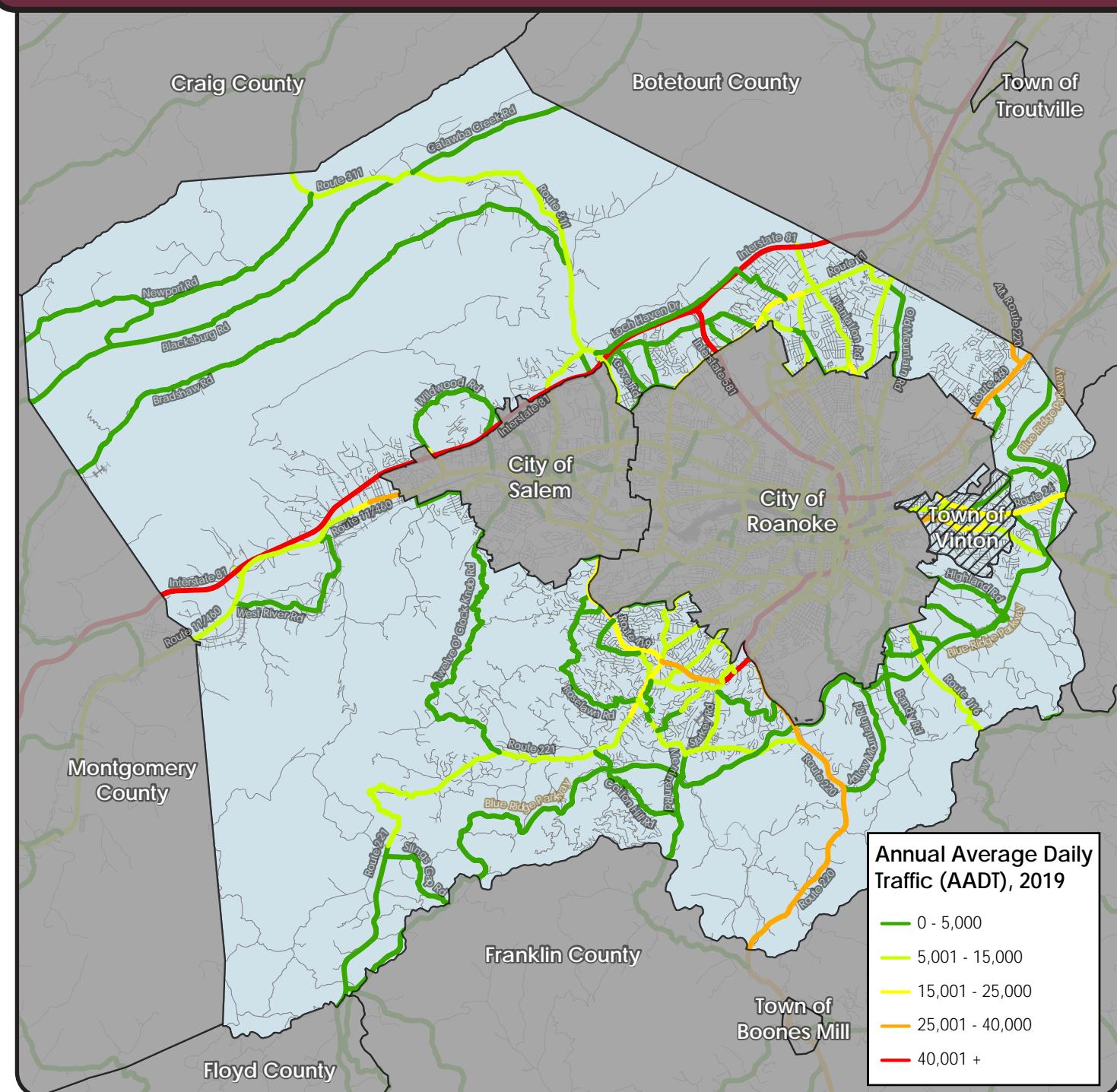
TRANSPORTATION

2019 Top Ten Annual Average Daily Traffic Segments						
Rank	Route Label	Route Name	Length (miles)	From	To	AADT
1	VA 419	Electric Rd	0.77	Roanoke City Line	80-904 Starkey Rd	40,000
2	US 460, US 221, Alt VA 220	Challenger Ave	1.63	Roanoke City Line	Alt US 220 Cloverdale Rd	35,000
3	US 220	Franklin Rd	6.46	Franklin County Line	Roanoke City Line	32,000
4	US 460, US 221	Challenger Ave	0.34	Alt US 220 Cloverdale Rd	Botetourt County Line	28,000
5	US 11, US 460	West Main St	0.64	80-642 Alleghany Dr	Salem City Line	28,000
6	VA 419	Electric Rd	1.44	80-904 Starkey Rd	US 221 Brambleton Ave	27,000
7	Alt VA 220	Cloverdale Rd	0.50	US 221, US 460	Botetourt County Line	26,000
8	VA 419	Electric Rd	3.16	US 221 Brambleton Ave	Salem City Line	22,000
9	US 221	Brambleton Ave	1.36	80-1683 Arlington Hills	SR 419 Electric Rd	21,000
10	VA 24	Washington Ave	1.25	Vinton Town Line	Bedford County Line	20,000

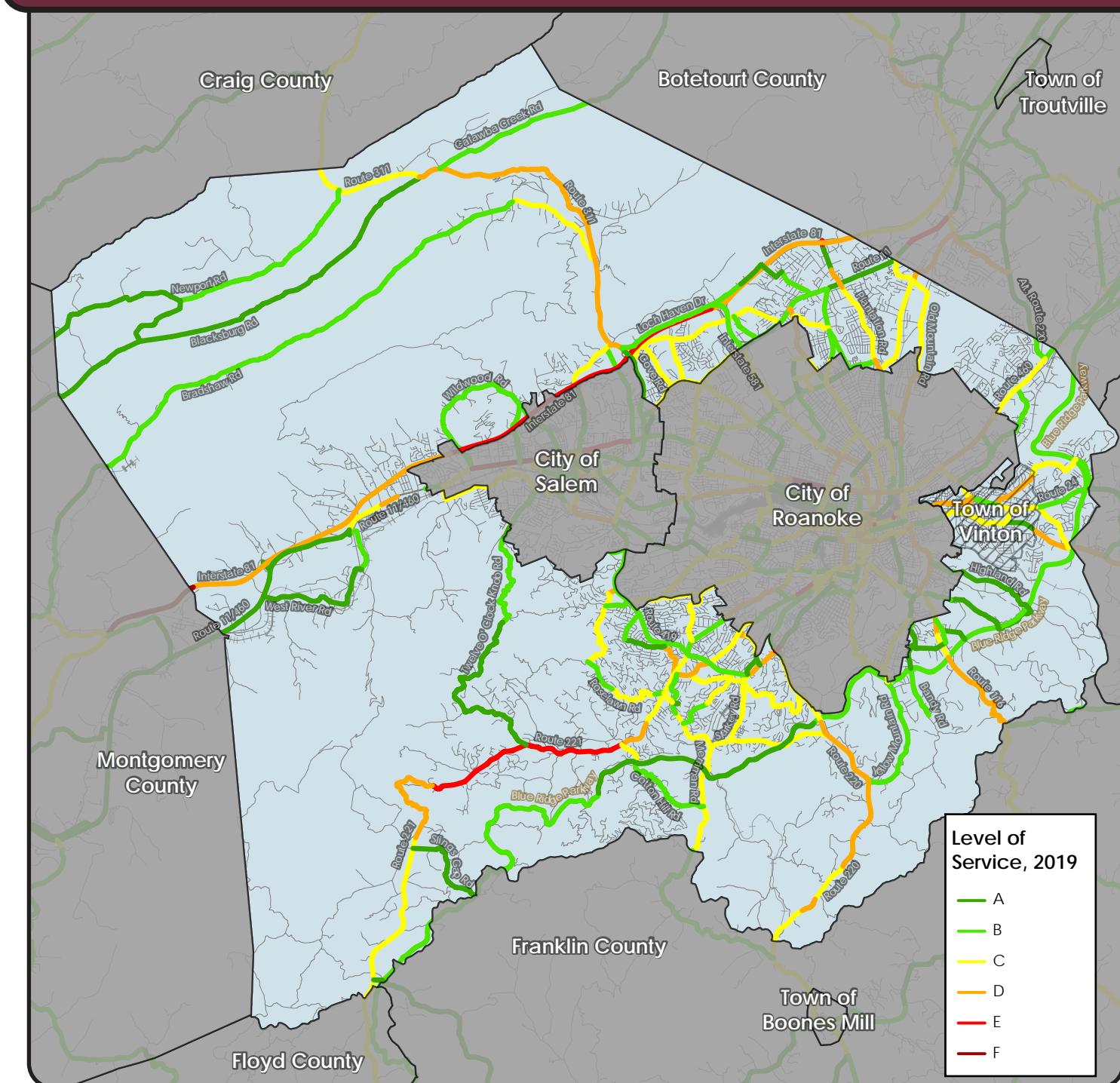
2021 Top Ten Annual Average Daily Traffic Segments							
Rank	Route Label	Route Name	Length (miles)	From	To	AADT	Change from 2019
1	VA 419	Electric Rd	0.77	Roanoke City Line	80-904 Starkey Rd	37,000	-3,000 (-7.5%)
2	US 460, US 221, Alt VA 220	Challenger Ave	1.63	Roanoke City Line	Alt US 220 Cloverdale Rd	34,000	-1,000 (-2.9%)
3	US 220	Franklin Rd	0.31	Blue Ridge Parkway	Roanoke City Line	29,000	-3,000 (-9.4%)
4	US 460, US 221	Challenger Ave	0.34	Alt US 220 Cloverdale Rd	Botetourt County Line	28,000	No change
5	US 220	Franklin Rd	6.15	Franklin County Line	Blue Ridge Parkway	26,000	-6,000 (-18.8%)
6	VA 419	Electric Rd	1.44	80-904 Starkey Rd	US 221 Brambleton Ave	26,000	-1,000 (-3.7%)
7	US 221	Brambleton Ave	1.36	80-1683 Arlington Hills	SR 419 Electric Rd	23,000	2,000 (+9.5%)
8	VA 419	Electric Rd	3.16	US 221 Brambleton Ave	Salem City Line	22,000	No change
9	Alt VA 220	Cloverdale Rd	0.50	US 221, US 460	Botetourt County Line	21,000	-5,000 (-19.2%)
10	VA 24	Washington Ave	1.25	Vinton Town Line	Bedford County Line	19,000	-1,000 (-5%)



Existing Conditions: AADT (2019)

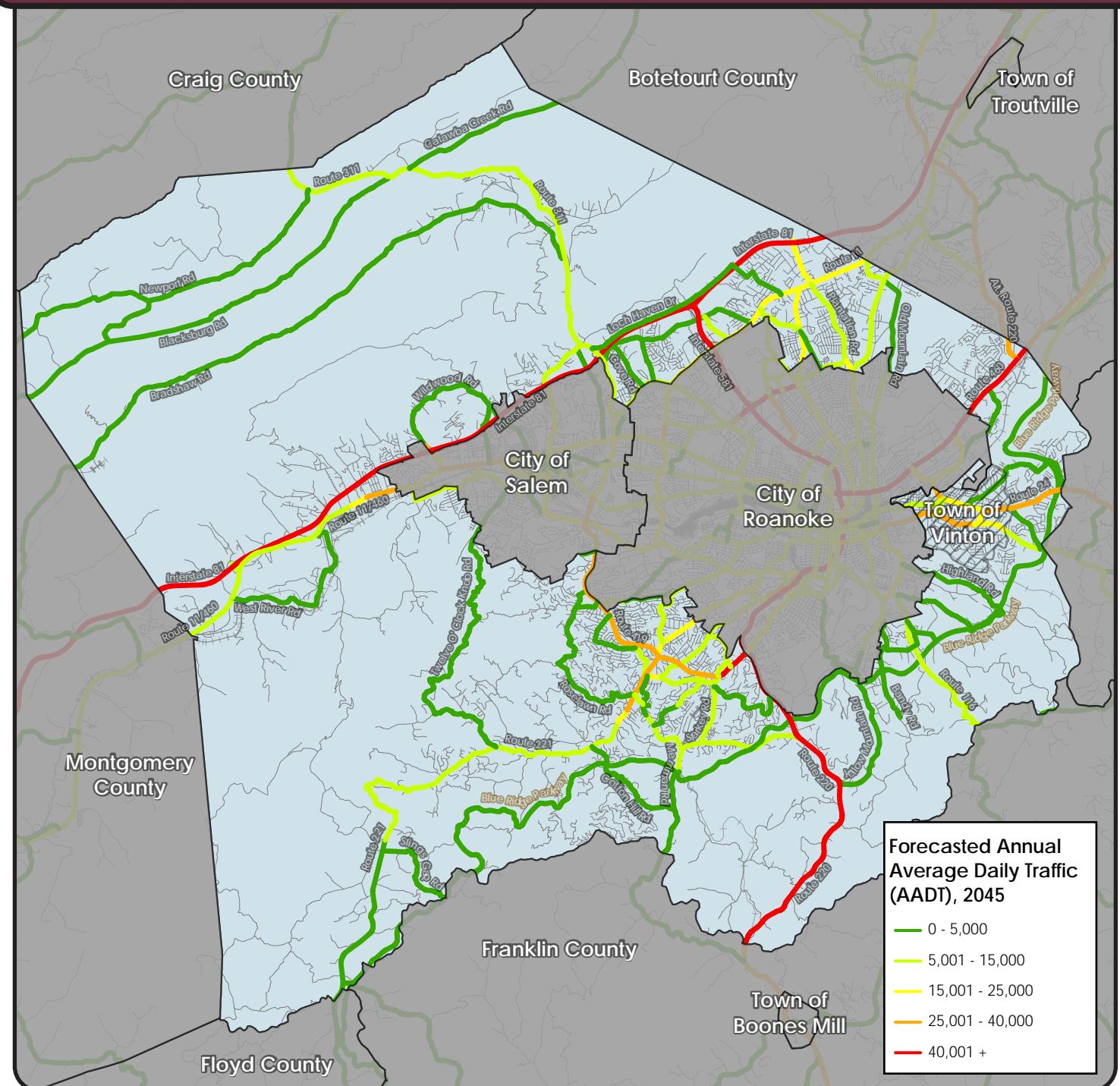


Existing Conditions: LOS (2019)

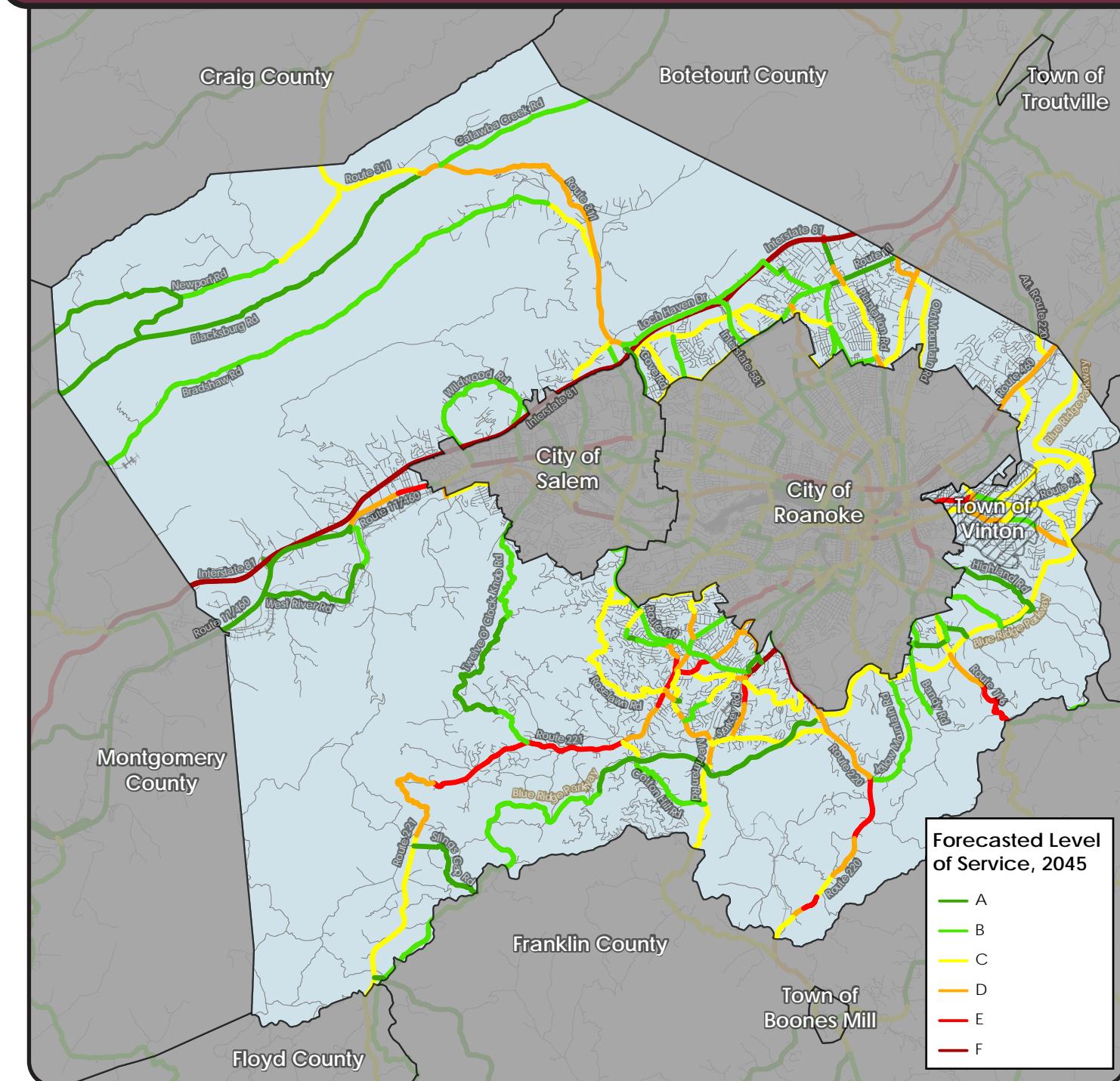




Traffic Projections: 2045 AADT



Traffic Projections: 2045 LOS





Ultimately, the challenges of safety, congestion, and outdated infrastructure are interrelated and should all be considered when identifying and planning for future projects.

Access Management

Access Management is an approach to locating, spacing, and designing entrances, street intersections, median openings, and traffic signals that focuses on minimizing conflict points and thus reducing crashes and congestion. Access Management regulations for VDOT roadways were first implemented in 2008 (principal arterials) and 2009 (minor arterials, collectors, and local roads), and in 2013 were combined into one unified set of regulations. Access Management design standards for all VDOT roadways were adopted as an appendix of the VDOT Road Design Manual in 2011. These regulations and design standards have helped to preserve safety and capacity on Roanoke County's winding rural roadways, on which sight distance calculations for entrances, intersections, and median openings may have been made with slower automobiles in mind, and on arterial and collector roads in the suburban parts of the County, which already have too many points of access due to strip commercial development.

Innovative Intersections and Interchanges

Innovative Intersections and Interchanges are alternative intersection or interchange configurations that are intended to improve traffic flow and safety. Innovative intersections give localities new, more affordable options for improving traffic flow and safety at problem locations where traditional widening, redesign, or relocation projects may be infeasible or ineffective. VDOT has approved thirteen innovative intersection designs, and seven innovative interchange designs, for use in Virginia. The following Innovative Intersection and Interchange designs have been constructed, or are funded to be constructed, in Roanoke County.

Roundabout

Roundabouts are circular, unsignalized intersections

where all traffic moves counterclockwise around a central island. Roundabouts can be constructed with either one or two, circular, interior lanes. Vehicles in the circular lanes possess the right of way and vehicles entering the roundabout must yield. Roundabouts have been constructed at the following intersections in Roanoke County, all with a single circular lane:

- Route 311, Route 419, and Orange Market (1821-1827 Thompson Memorial Drive)
- Penn Forest Boulevard and Colonial Avenue
- Merriman Road, Meadowlark Road, Penn Forest Elementary School (6328 Merriman Road), and the South County Library (6303 Merriman Road)
- Starkey Road and Buck Mountain Road

Thru-Cut

A thru-cut is an intersection where through movements from side streets are prohibited. To complete a through movement, side street vehicles must turn left or right then make another turn at an existing opening. A project, which implements recommendations from the Route 460 (Challenger Avenue) Corridor Improvement Study, is funded to improve intersections on Route 460 between West Ruritan Road and Huntridge Road. This funded project includes the installation of a thru-cut at West Ruritan Road and CVS Pharmacy (3909 Challenger Avenue). Thru-cuts are also funded for four intersections on Route 220 between the City of Roanoke and Franklin County, implementing recommendations from the 2017 U.S. 220 Arterial Preservation Program Study.

Restricted Crossing U-Turn

Also known as "superstreet" intersections, Restricted Crossing U-Turn (RCUTs), are intersections where all side street movements start with a right turn. Dedicated downstream median openings are constructed so that vehicles originating from side streets can complete the through and left turn movements. The intersection at Route 419 and Bernard Drive, near the Roanoke County Administration Center, is an RCUT. Roanoke

County was recently awarded funding to construct two more RCUTs on Route 419, at Stoneybrook Drive and Member One Federal Credit Union (2310 Electric Road), and at Glen Heather Drive. Additionally, as part of the funded project for Route 460 intersections between West Ruritan Road and Huntridge Road, RCUTs will be constructed on Route 460 at Carson Road, at East Ruritan Road, at Bonsack Road, and in front of the Country Corner Store (4723 Challenger Avenue). A modified "half RCUT" will be constructed at the Huntridge Road intersection. This modified RCUT will prohibit left turns from Huntridge Road onto Route 460 eastbound and eastbound-to-westbound U-turns on Route 460, and will only allow left turns from eastbound Route 460 to Huntridge Road.

Continuous Green-T

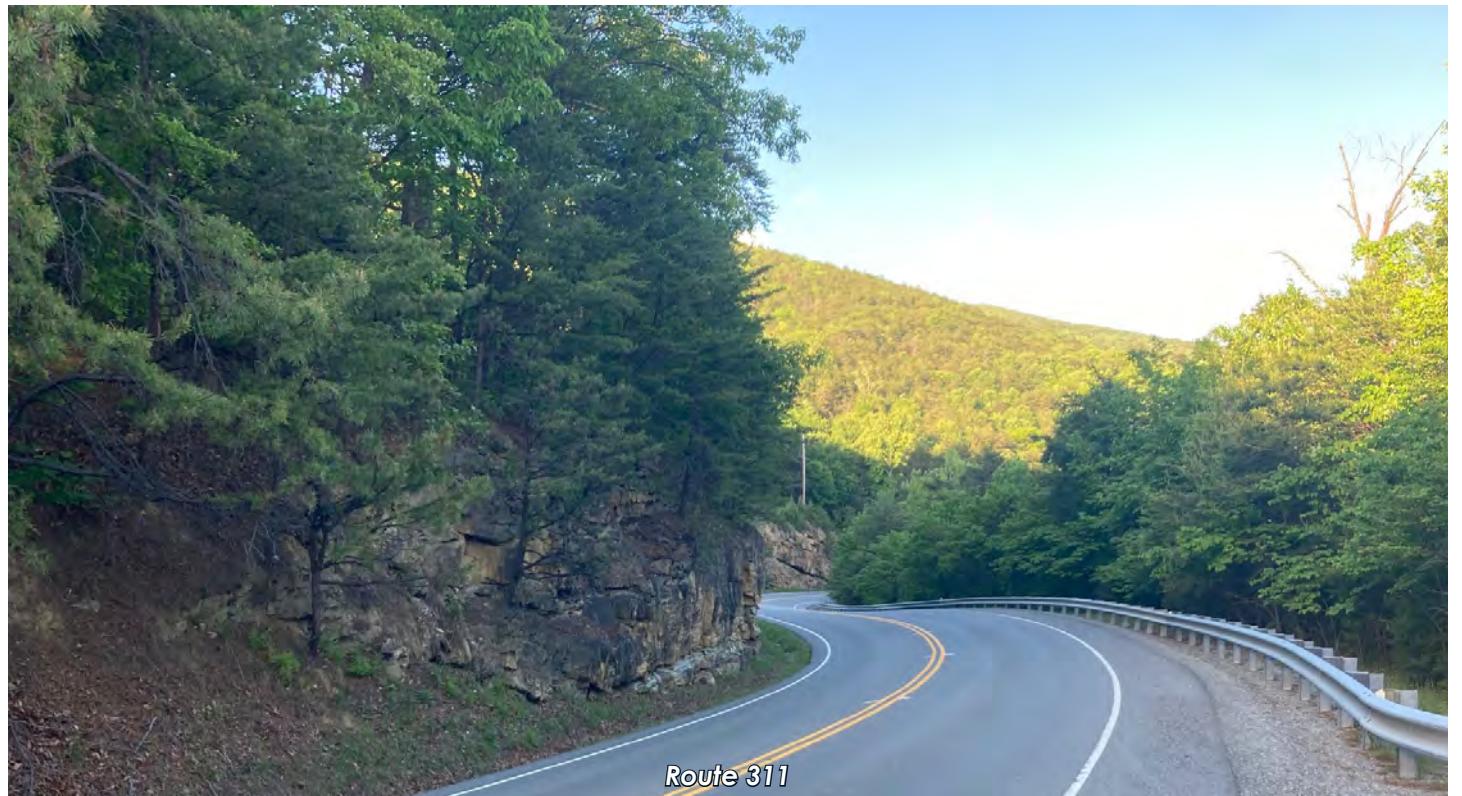
A Continuous Green-T (CGT) is a three-legged intersection on a divided highway where one direction of travel on the divided highway can continue through the intersection without stopping, and the other direction of travel on the divided highway has a signalized intersection with the roadway that is connecting to the divided highway. Roanoke County has received funding to construct a CGT at the intersection of Route 460 and Route 220 Alternate (westbound Route 460 will be signalized and eastbound Route 460 will not). This project implements a recommendation of the Route 460 (Challenger Avenue) Corridor Improvement Study.

Displaced Left Turn

A Displaced Left Turn (DLT) is a leg of an intersection where vehicles cross to the other side of the opposing through traffic in advance of an intersection. As part of the funded Route 460 at Route 220 Alternate project, a DLT will be utilized for the signalized left turn movement from Route 220 Alternate onto eastbound Route 460. This DLT was recommended in both the U.S. 460 Arterial Preservation Program Study and the Route 460 (Challenger Avenue) Corridor Improvement Study.

Diverging Diamond Interchange

A Diverging Diamond Interchange (DDI) is a



grade-separated interchange where traffic on the intersecting arterial roadway crosses to the other side of opposing through traffic for the distance between freeway ramps. This requires two signalized "crossovers" where vehicles on the arterial roadway switch sides, first from the right side to the left side, then back to the right side. This configuration allows all movements on and off freeway ramps to be unsignalized. The Interstate 581/Valley View Boulevard interchange in the City of Roanoke is a modified "half DDI" with only one crossover, as Valley View Boulevard does not continue west of I-581. Roanoke County has secured funding to construct the first full DDI in the Roanoke Valley at the Route 220/Route 419 interchange, which is also partially located in the City of Roanoke.

VDOT Maintenance Activities

VDOT maintains all public roadways and associated right-of-way that extends beyond the edge of pavement in Roanoke County. Typical maintenance activities include:

- Repairing pavement and resurfacing/surface treatment, to include striping where applicable
- Removing snow
- Keeping traffic signals operational
- Repairing and replacing regulatory signs
- Mowing grass and trimming vegetation to maintain sight distance and sign visibility
- Maintaining stormwater management infrastructure associated with roadways except on subdivision streets and rare cases of County-maintained facilities on VDOT-owned right-of-way

The VDOT Residency dedicates funding for Roanoke County through the Secondary Six-Year Program for the following activities:

- Traffic Services
- Engineering and Surveying

- Fertilization and Seeding
- Right-of-Way Engineering

These accounts are charged when Roanoke County requests related tasks or assistance that fall within these categories.

Maintenance Funding for Roanoke County Projects

As greenways and multimodal transportation projects are completed, it is important to dedicate sufficient County funding and resources to maintain these facilities. While some projects like sidewalks and bicycle lanes may be located within the VDOT right-of-way, VDOT does not have resources available to weed, sweep or mow grass adjacent to these facilities. Greenways are typically located outside of VDOT right-of-way so these facilities are Roanoke County's responsibility to maintain.

VDOT Traffic Operations Center

VDOT operates five Traffic Operations Centers (TOCs) throughout the Commonwealth, and one TOC is located in Roanoke County near Interstate 81 Exit 140. TOCs utilize Intelligent Transportation Systems (ITS) - advanced applications that deliver innovative services to enable users to make safer, more coordinated, and smarter use of transport networks – to monitor traffic conditions and deliver traffic information to motorists, program changeable message signs, monitor weather conditions, control access at busy interstate on-ramps (no on-ramps in Roanoke County require this), provide rapid response to roadway incidents, and coordinate signals on detour routes.

Changeable Message Signs

Throughout the Commonwealth, VDOT uses changeable message signs to convey vital real-time information about traffic incidents, congestion, work zones and inclement weather to motorists. In 2021, VDOT installed thirty changeable message signs in the Interstate 81 (I-81) corridor to implement recommendations of the I-81 Corridor Improvement Plan. Twenty-one of these signs were

installed on I-81, and nine were installed on the busiest interstates and arterial routes that feed into I-81 to deliver information to motorists to help them decide whether to merge onto the interstate. One new sign was installed on northbound I-81 at mile marker 142 in Roanoke County, and another new sign was installed on southbound I-81 at mile marker 147.3 in Botetourt County - 0.1 mile before southbound motorists enter Roanoke County.

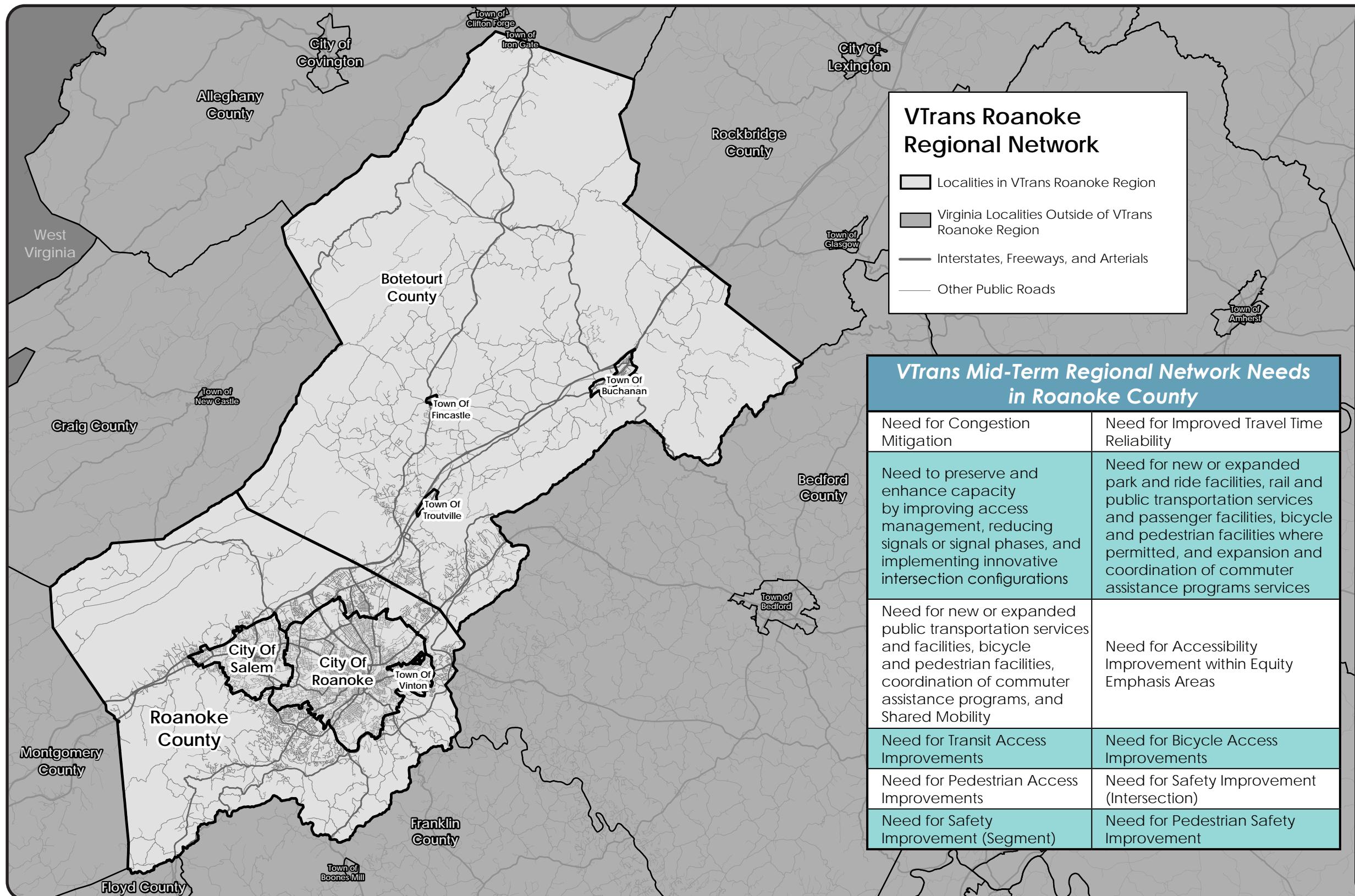
The VDOT Salem District also owns a number of portable changeable message signs that are deployed throughout the district, including in Roanoke County, to convey real-time information on a short-term basis to motorists on lower traffic roadways.

Signal Coordination

In recent years, VDOT has coordinated signals at key intersections on four principal arterial routes in Roanoke County: U.S. Routes 220, 221, and 460, and State Route 419. This has improved traffic flow on these routes and has been well-received by citizens, who have consistently called for more signals to be coordinated. However, the cost of coordinating signals is high so the coordination of traffic signals throughout the Roanoke Valley will be a slow process. Coordination of signals on I-81 detour routes will be the top priority.

Interstate 81 Detour Routes

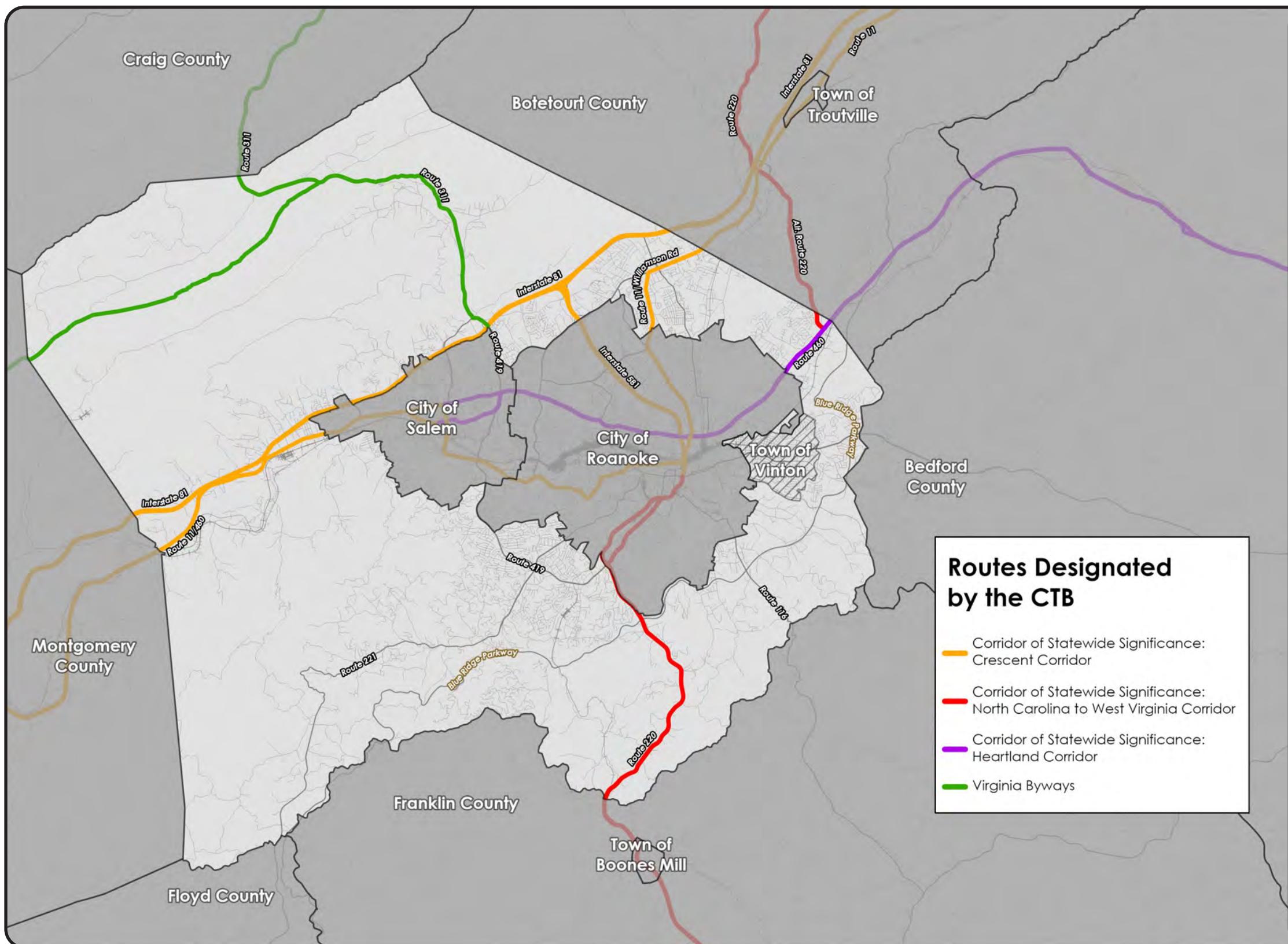
In parallel and in support of the 2018 I-81 Corridor Improvement Plan, OIPI developed at least one incident detour plan for each exit-to-exit segment of I-81 in Virginia. Incident detour plans were developed for some short segments between the off-ramp and on-ramp at the same exit, as well. These plans were developed in conjunction with VDOT, Virginia State Police, and localities. Thirteen different incident detour plans utilize Roanoke County roadways. South of Exit 140 in Roanoke County, these plans mostly utilize Route 11/460 as a detour route. North of Exit 140, these routes utilize a wide range of corridors including (from west to east) Thompson Memorial Drive, North Electric Road, Peters Creek Road, Interstate 581, Williamson Road, and Plantation Road. Since the



VTrans Roanoke Region

Regional Networks (RNs) are one of three travel markets - along with Corridors of Statewide Significance and Urban Development Areas (called Designated Growth Areas in Roanoke County) - from which VTrans, Virginia's multimodal surface transportation plan, identifies mid-term needs and priority locations. There are fifteen RNs in Virginia.

Counties that are at least partially within the service area of a Metropolitan Planning Organization (MPO) are included in RNs corresponding to their MPOs. Roanoke County is in the Roanoke Region, which contains every locality in the RVTPO service area except for Bedford County and Montgomery County, as those two counties have more territory served by other MPOs than they have in the RVTPO service area. The VTrans mid-term needs for the Roanoke Regional Network found in Roanoke County are detailed in the table on this page.



Routes Designated by the Commonwealth Transportation Board

The Commonwealth Transportation Board (CTB) designates two types of routes, Corridors of Statewide Significance and Virginia Byways, which serve vastly different functions.

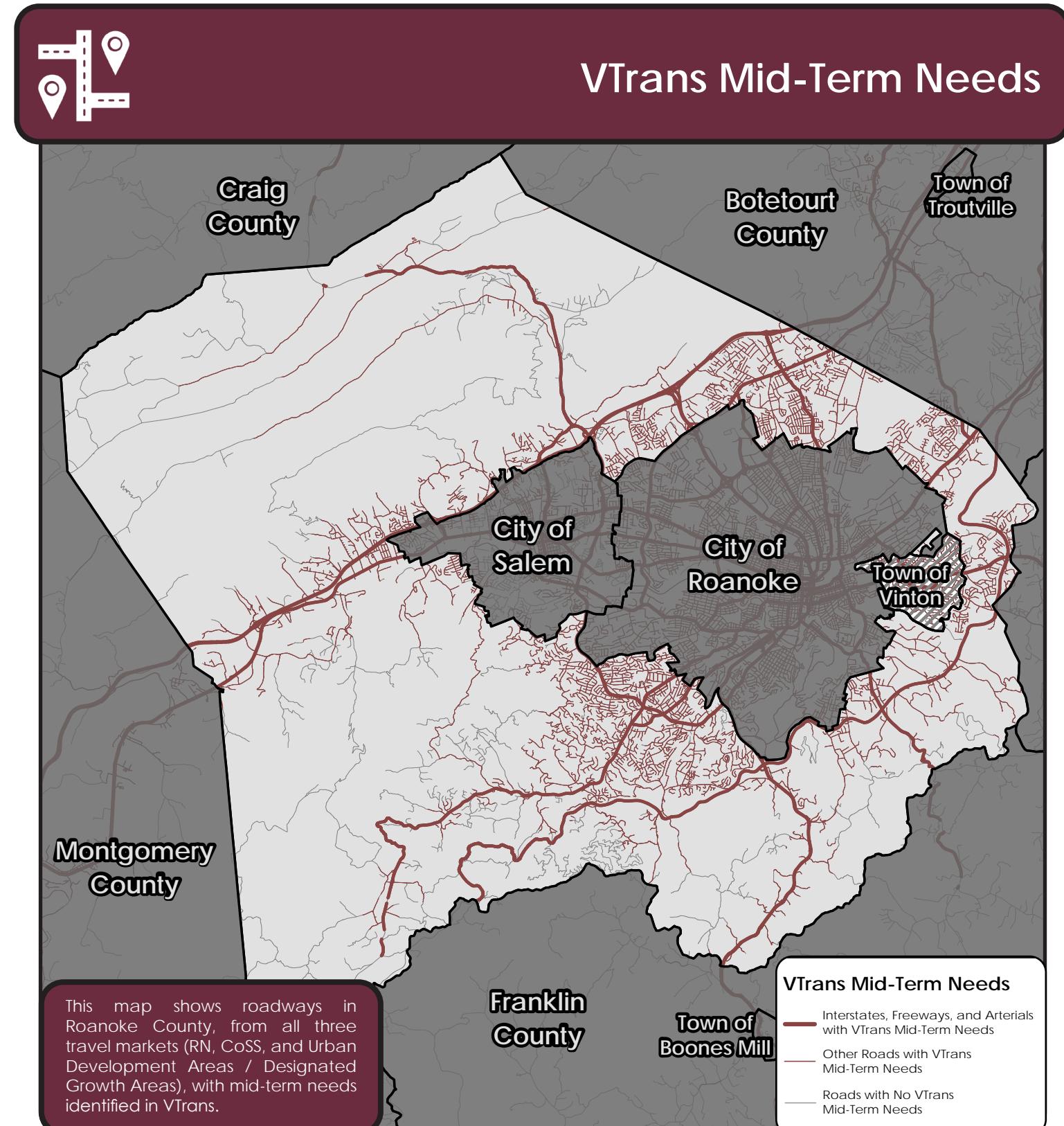
Corridors of Statewide Significance (CoSS) are another travel market for which VTrans identifies mid-term needs. CoSS represent integrated, multimodal networks that connect major activity centers throughout Virginia and promote the long-range movements of people and goods that are essential to the economic prosperity of the Commonwealth. Twelve CoSS have been designated by the CTB, and three pass through Roanoke County. A table on the following page details the roadway segments in Roanoke County included in CoSS, and the VTrans mid-term needs identified for these segments.

Virginia Byways are roads that have high aesthetic or cultural value that are within or lead to areas of historical, natural, or recreational significance. For a road to be designated a Virginia Byway, designation must be supported by VDOT, the Department of Conservation and Recreation (DCR), and the localities the roadway is in. Once designated by the CTB, Virginia Byways are managed by VDOT and DCR. The road segments in Roanoke County that are parts of Virginia Byways are detailed in a table on the following page. Both the Virginia Byways table and CoSS table are color coded to the map on this page.

Corridors of Statewide Significance in Roanoke County	
Locations and VTrans Mid-Term Needs	
Crescent Corridor	
Segments in Roanoke County	
Interstate 81 between Botetourt County and the City of Salem	
Interstate 81 between the City of Salem (Wildwood Road east) and the City of Salem (Wildwood Road west)	
Interstate 81 between the City of Salem and Montgomery County	
Interstate 581 between Interstate 81 and the City of Roanoke	
Route 11/Williamson Road between Botetourt County and the City of Roanoke	
Route 11/460 between the City of Salem and Montgomery County	
VTrans Mid-Term Needs	
Need for Congestion Mitigation	
Need to preserve and enhance capacity by improving access management, reducing signals or signal phases, and implementing innovative intersection configurations	
Need for new or expanded park and ride facilities, rail and public transportation services and passenger facilities, bicycle and pedestrian facilities where permitted, and expansion and coordination of commuter assistance programs services	
Need for Safety Improvement on Corridors of Statewide Significance (Intersection)	
Need for Safety Improvement on Corridors of Statewide Significance (Segment)	
North Carolina to West Virginia Corridor	
Segments in Roanoke County	
Alternate Route 220 between Botetourt County and Route 460	
Route 220 between the City of Roanoke and Franklin County	
VTrans Mid-Term Needs	
Need for Congestion Mitigation	
Need for Improved Travel Time Reliability	
Need to preserve and enhance capacity by improving access management, reducing signals or signal phases, and implementing innovative intersection configurations	
Need for Safety Improvement on Corridors of Statewide Significance (Intersection)	
Need for Safety Improvement on Corridors of Statewide Significance (Segment)	
Heartland Corridor	
Segment in Roanoke County	
Route 460 between Botetourt County and the City of Roanoke	
VTrans Mid-Term Needs	
Need for Safety Improvement on Corridors of Statewide Significance (Intersection)	
Need for Safety Improvement on Corridors of Statewide Significance (Segment)	

Virginia Byways in Roanoke County

- Route 419 between Interstate 81 and Route 311
- Route 311 between Route 419 and Craig County
- Blacksburg Road between Route 311 and Montgomery County



adoption of the I-81 Corridor Improvement Plan, VDOT has completed upgrades to traffic signals and communications at numerous intersections along I-81 detour routes in Roanoke County.

Tractor Trailer Parking

Roanoke County has experienced issues with inadequate parking and resources for tractor trailers for many years, particularly near warehousing and distribution or manufacturing businesses. A 2015 Virginia Truck Parking Study prepared for VDOT identified a deficit of 692 truck parking spaces along Interstate 81 between the Tennessee State Line and Interstate 64. Recommendations from that study include:

1. Partner with private industry and local governments to increase capacity and related improvements
2. Provide accurate and real-time information about truck parking supply and availability in Virginia
3. Improve the safety, effectiveness, and supply of truck parking spaces at State-owned facilities

As online shopping continues to gain dominance over brick-and-mortar retail, more and more goods will be shipped via tractor trailer. Over the next fifteen years, the scale, and consequences, of Southwest Virginia's truck parking deficit will only increase, unless more truck parking spaces are constructed or innovations occur that give other modes of freight transportation the combination of speed, flexibility, and cost effectiveness necessary to compete with tractor trailers.

Bridge Load Rating Changes for Emergency Vehicles

The Fixing America's Surface Transportation (FAST) Act, passed in 2016, amended a section of United States Code to revise Emergency Vehicle weight limits for bridges on the Interstate System and within reasonable access to the Interstate System. As a result, signs at many VDOT bridges in Roanoke County have been updated over the

past few years to specify new Emergency Vehicle maximum weight limits. Due to the new posted weight limits, one bridge on each of the following roads will not support all Roanoke County Fire and Rescue equipment:

- Old Catawba Road, Route 864
- Fort Lewis Church Road, Route 777
- East Ruritan Road, Route 609
- Willow Branch Road, Route 677
- Crescent Boulevard, Route 632
- McVitty Road, Route 1662
- Gladden Road, Route 737
- Bent Mountain Road, Route 221



When alternate routes with a similar arrival time are available, the posted bridges do not present an issue. When there are no alternate routes available, lighter equipment must be substituted to cross the posted bridges to respond to emergencies. Roanoke County has made VDOT aware of the bridges that present challenges for emergency services. Collaboration with VDOT is needed when opportunities arise to upgrade these bridges to carry all Emergency Vehicles.

Visit Virginia's Blue Ridge Wayfinding Signs

Since 2018, Visit Virginia's Blue Ridge (VBR), an outdoor tourism marketing organization funded by Botetourt, Franklin, and Roanoke Counties and the Cities of Roanoke and Salem, has led an effort to install consistent wayfinding signage throughout the Roanoke Valley. As of November 2023, three



VBR wayfinding signs have been installed in Roanoke County, all collaborations with the City of Roanoke – two directing visitors to the Carvins Cove Boat Launch at the intersection of Williamson Road and Reservoir Road, and one gateway sign at the City-County line on Brambleton Avenue. The signs are attractive, but costly, so the process has been slow. Roanoke County has committed to partnering with Botetourt County and the Cities of Roanoke and Salem to construct eight (8) VBR wayfinding signs in the coming years.

Interstate 73

Planned to run between Charleston, South Carolina and Detroit, Michigan, Interstate 73 (I-73), if constructed, would run through the Roanoke Valley roughly following the path of U.S. Route 220 (south of Interstate 581) and Interstate 581, and would be co-located with Interstate 81 between Interstate 581 and the New River Valley. Thus far, only North Carolina has constructed a section of I-73, a 101-mile section between Ellerbe and Greensboro. Through most of the 1990s and early 2000s, VDOT intended on constructing I-73 in Virginia, and conducted years of studies and public outreach to advance the project. However, the reductions in funding for transportation projects in the aftermath of the 2008 financial crisis prompted VDOT to shelve the project, and it has remained a low priority in Virginia since. Like Virginia, most states included in the proposed I-73 corridor have not prioritized the project. The future of I-73 is uncertain.

6.6 Transit

 Several modes of transit are available within the Roanoke Valley and run through Roanoke County. The County currently operates the CORTRAN program and the McAfee Knob Trailhead Shuttle.

Valley Metro

The Greater Roanoke Transit Company (GRTC) operates public transportation in the Roanoke Valley, including Valley Metro and the Smart

TRANSPORTATION

Way Bus. Valley Metro operates within the City of Roanoke, City of Salem and the Town of Vinton.

Three of Valley Metro's local bus routes have stops in Roanoke County. Two routes pass through and stop at the Tanglewood Mall area, utilizing Electric Road and Ogden Road. The third route travels along Plantation Road and Hershberger Road to provide service to the Food Lion shopping center, the Walmart Neighborhood Market, to Edinburgh Square apartments and to Friendship Living. There are no bus shelters located at any of the Valley Metro stops in Roanoke County, with the exception of one bus shelter located on the north side of Hershberger Road at Friendship Living.

Valley Metro operates S.T.A.R. (Specialized Transit – Arranged Rides) paratransit service to provide transportation for disabled individuals who cannot ride Valley Metro. The service area includes three-quarters of one mile from the regular Valley Metro fixed route within the City of Roanoke, the City of Salem and the Town of Vinton. RADAR (Roanoke Area Dial-A-Ride) operates this service for Valley Metro.



The Smart Way commuter bus, which connects Roanoke to the New River Valley, has one stop in Roanoke County at the Interstate 81 Exit 140 Park and Ride lot in Salem. The route offers ten stops between downtown Roanoke and Virginia Tech in Blacksburg. The Smart Way Express connects the Virginia Tech Carilion campus in Roanoke with Virginia Tech in Blacksburg.

CORTAN

County of Roanoke Transportation (CORTAN) began operating in 1985 using a vendor to transport seniors, and those with disabilities from their homes to destinations within Roanoke County, the City of Roanoke, the City of Salem and the Town of Vinton. This program helps Roanoke County residents stay in their homes and remain independent.

CORTAN is currently operated by Via, a contracted service, and provides an on demand, curb-to-curb, ride share service Monday through Friday from 7:00 AM to 6:00 PM. Roanoke County residents, age 65 or older and those who have disabilities are eligible for the service. Rides are

five dollars per trip. Booking options include the CORTAN App, web portal or phone bookings.

CORTAN provides essential transportation services to an average of 83 residents a month along with an average of 800 trips a month for medical appointments, education, employment and shopping.

CORTAN is funded by Roanoke County. Grant funding has been applied for and obtained from the Department of Rail and Public Transportation (DRPT) since 2020 to offset the County's operating cost for the program. Current DRPT funding is available through September 2024.

McAfee Knob Trailhead Shuttle

Due to growing popularity and resulting parking challenges for hikers wanting to hike to McAfee Knob, Roanoke County launched the McAfee Knob Trailhead Shuttle in the Fall of 2022 to transport hikers from the Interstate 81 Exit 140 Park and Ride lot in Salem to the National Park Service's McAfee Knob Trailhead parking lot on



the Appalachian National Scenic Trail (AT). The shuttle service implements the National Park Service's 2021 Appalachian National Scenic Trail, Triple Crown Area Transit Feasibility Study.

Over the 37 days of service in 2022 the shuttle transported 488 passengers and had 716 reservations. Day hikers and thru-hikers comprised the population of individuals from 49 zip codes and 13 states, including the District of Columbia, with international hikers from Germany and Turkey.

Shuttle service resumed on March 3, 2023, through November 26, 2023, with 1,531 reservations. Ridership has increased in 2024 due to the closure of the trailhead parking lot for pedestrian bridge construction. A total of 1,211 reservations were booked between March 1, 2024 and April 30, 2024. The service operates on Fridays, Saturdays, Sundays and holidays that fall on a Monday. Roanoke County currently partners with Ride Source to provide the service and reservations may be made through www.McAfeeShuttle.com. The service provides easy and convenient transportation, for a small fee, for local residents and visitors to the

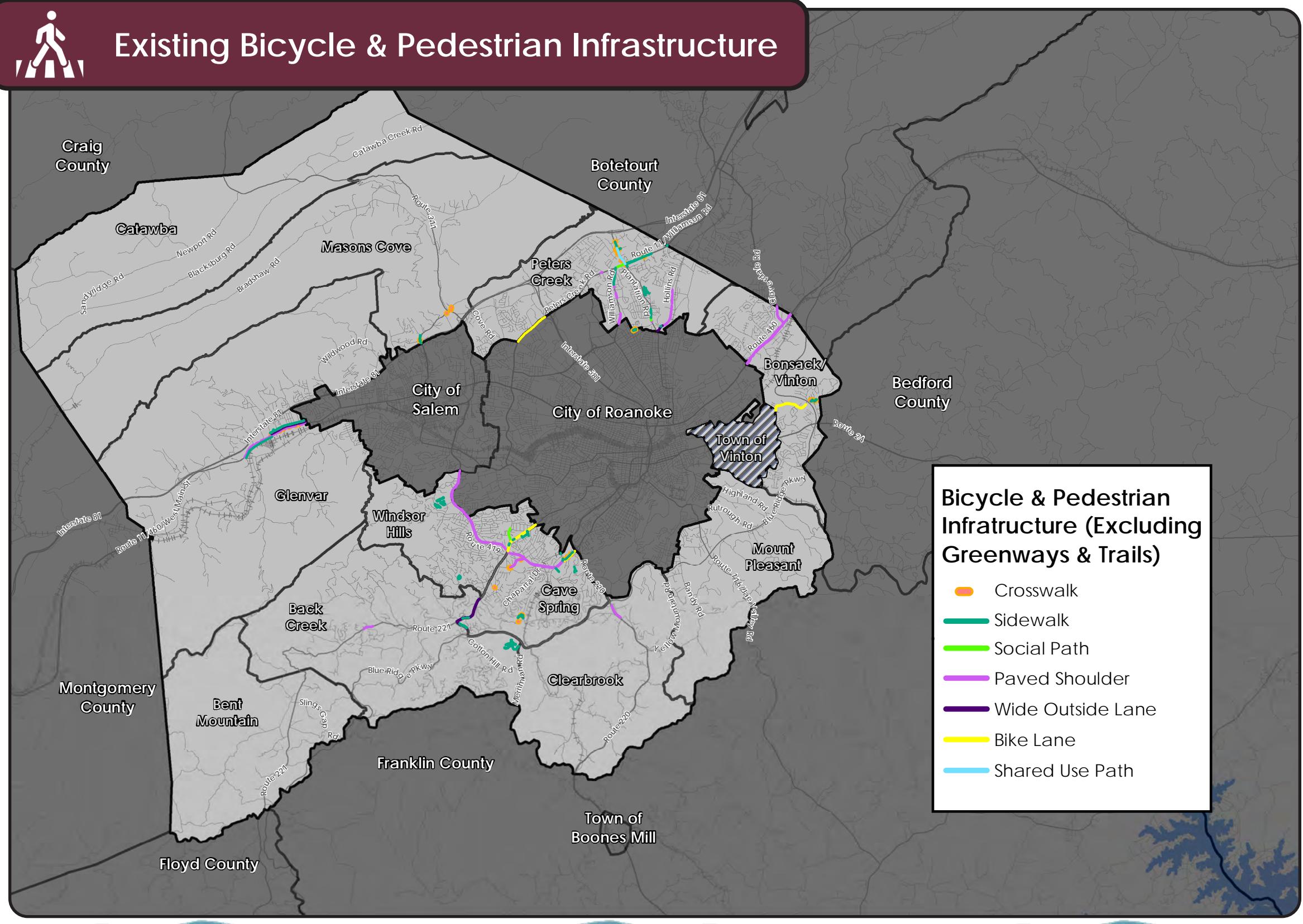
SHUTTLE STOP



www.McAfeeShuttle.com



Existing Bicycle & Pedestrian Infrastructure



area. Shuttle vehicles are equipped with cameras and Real Time tracking of the shuttle.

DRPT has funded the expansion of the shuttle service in 2024 and through June 2025. The McAfee Knob Trailhead Shuttle is currently funded by Roanoke County. Operation costs are offset with grant funding from DRPT through June 2025.

RVARC Ride Solutions

The Roanoke Valley-Alleghany Regional Commission houses RIDE Solutions, a Transportation Demand Management (TDM) Agency. RIDE Solutions assists commuters and employers with commuting options to reduce traffic on roadways and to improve air quality with fewer vehicle emissions.

Virginia Breeze

The Virginia Breeze Intercity Bus Service is operated by Megabus and funded by DRPT. The Highlands Rhythm route provides one trip daily northbound and one trip daily southbound, from the Interstate 81 Exit 140 Park and Ride lot in Salem and includes seven stops between Bristol and Washington D.C.

6.7 Bicycle & Pedestrian





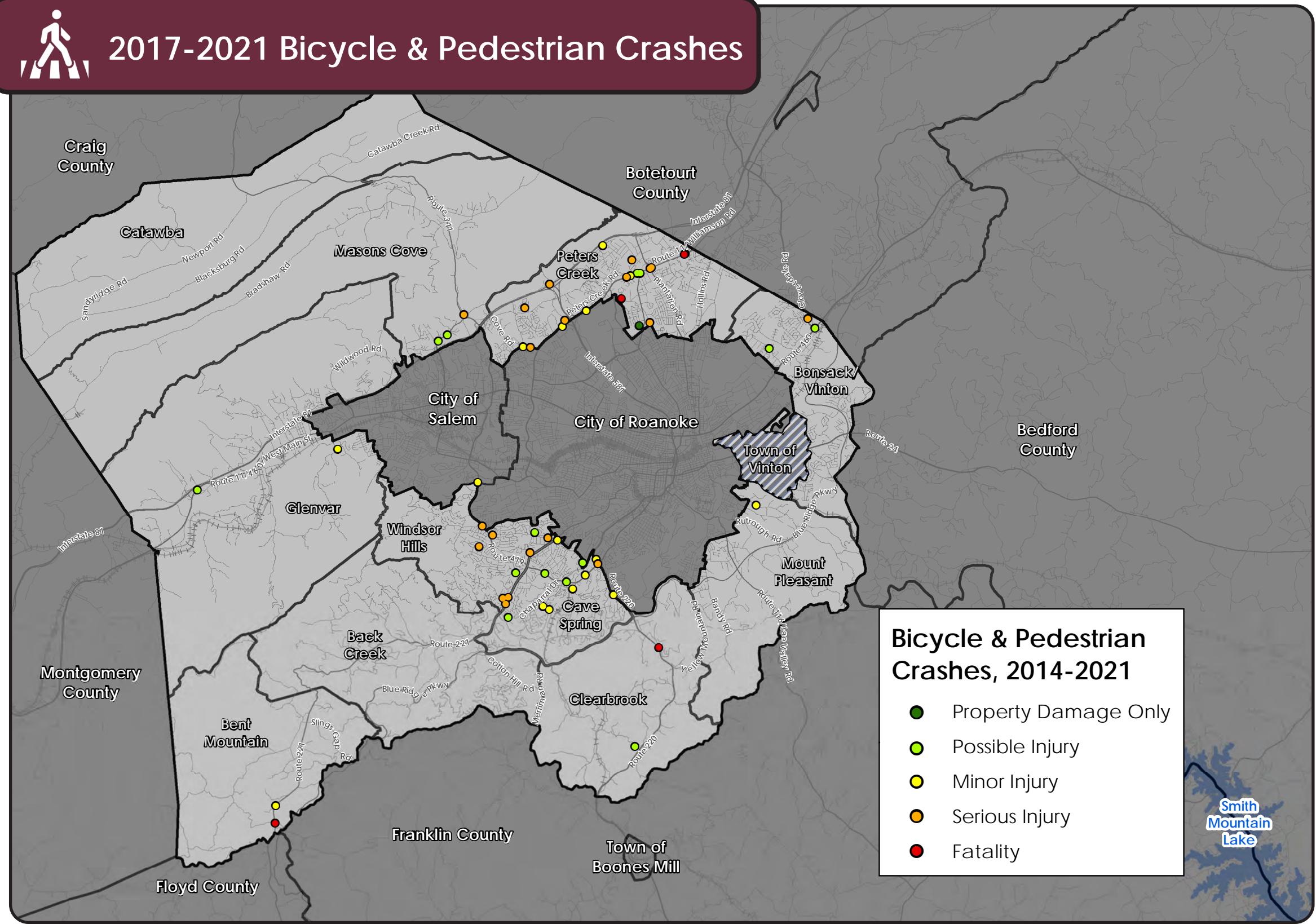
Roanoke County is home to a growing network of bicycle and pedestrian infrastructure, but the system still lacks connectivity. Much has been achieved since the adoption of the 2005 Comprehensive Plan, but there is a long way to go before the network is connected enough to become a viable transportation option for any significant portion of Roanoke County's population. Excluding greenways and trails, which are discussed at length in Section 6.8, there are approximately 16 miles of shared use paths, sidewalks, or bicycle lanes in Roanoke County. The map on this page shows all the existing bicycle and pedestrian infrastructure in Roanoke County, excluding greenways and trails.

Changing Preferences

Transportation preferences are changing, and in the next fifteen years it will become increasingly



2017-2021 Bicycle & Pedestrian Crashes



important for Roanoke County to supply its citizens with a connected network of bicycle and pedestrian infrastructure. A recent study estimated that Millennials drive 8%-9% less than Gen-Xers or Baby Boomers (Zhang & Li, 2022). The 2020 National Association of Realtors Community and Transportation Preferences Survey found that Gen-Xers, Millennials, and Gen-Zers value living within walking distance of work and amenities more than Baby Boomers and members of the Silent/Greatest Generation. In the public engagement process for this plan, many residents expressed a desire to see a more connected network of bicycle and pedestrian infrastructure in Roanoke County (see Community Engagement, Chapter 8). At some point in the next fifteen years, it will likely become essential for at least some parts of Roanoke County to have connected bicycle and pedestrian networks if the County wishes to attract and retain new residents and businesses.

Safety

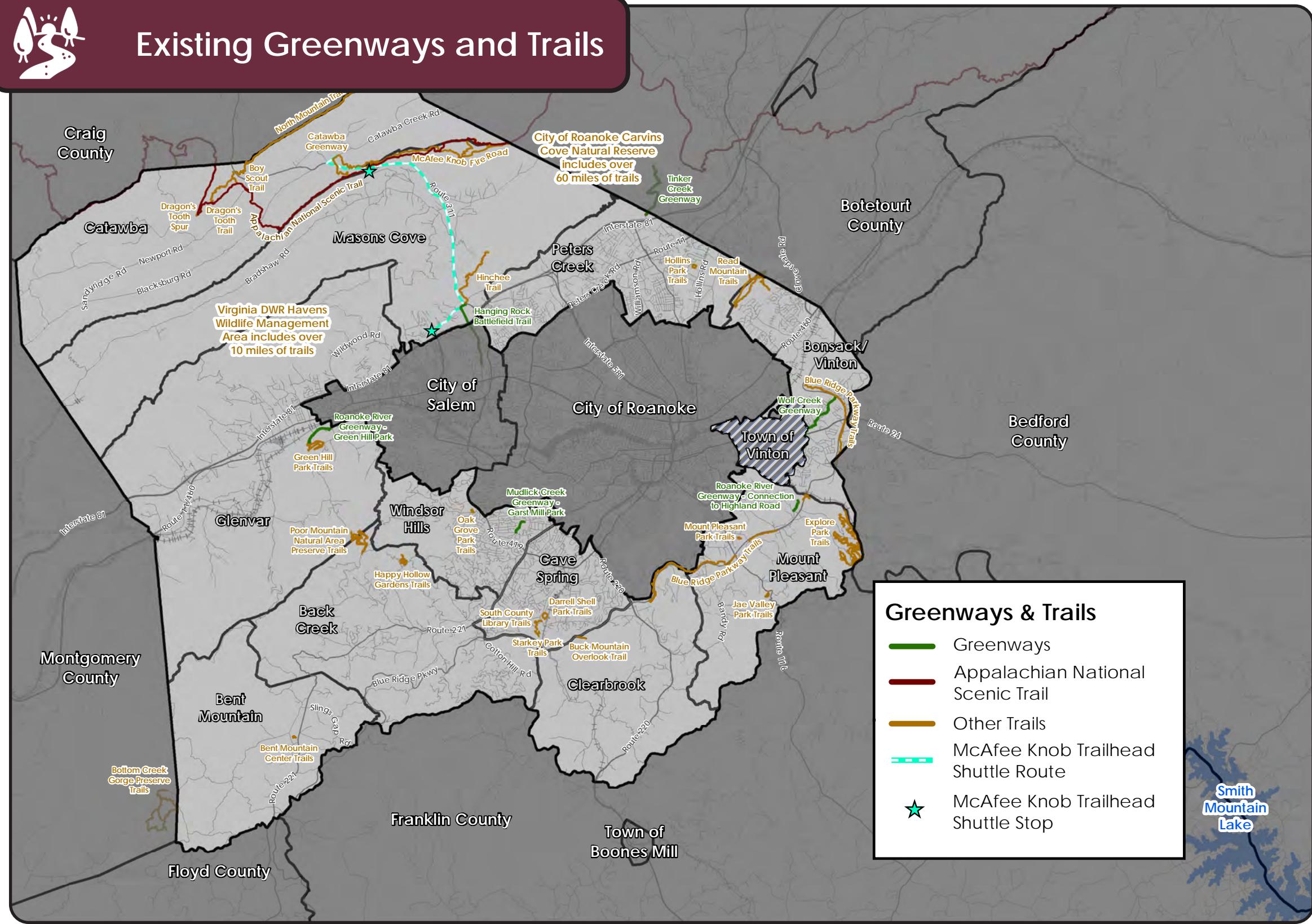
Between January 2014 and June 2021, there were fifty-six crashes reported involving a cyclist or pedestrian in Roanoke County. Twenty-one of these crashes resulted in a serious injury and four crashes were fatal. It is estimated that a large percentage of crashes involving cyclists and pedestrians go unreported (Pedestrian and Bicycle Information Center, 2022; Calma & Jackson, 2021), so it is likely that there were more crashes during this time period than were reported. In the public engagement process for this plan, many residents voiced concern for the safety of bicyclists on roads (see Community Engagement, Chapter 8).

Current Projects

To address gaps in connectivity, keep pace with changing preferences, and address safety concerns, Roanoke County and VDOT have in recent years submitted numerous funding requests for bicycle and pedestrian projects. Many of these funding requests have been successful, including the funding requests for the following current and recently completed projects (as of October 2023):



Existing Greenways and Trails



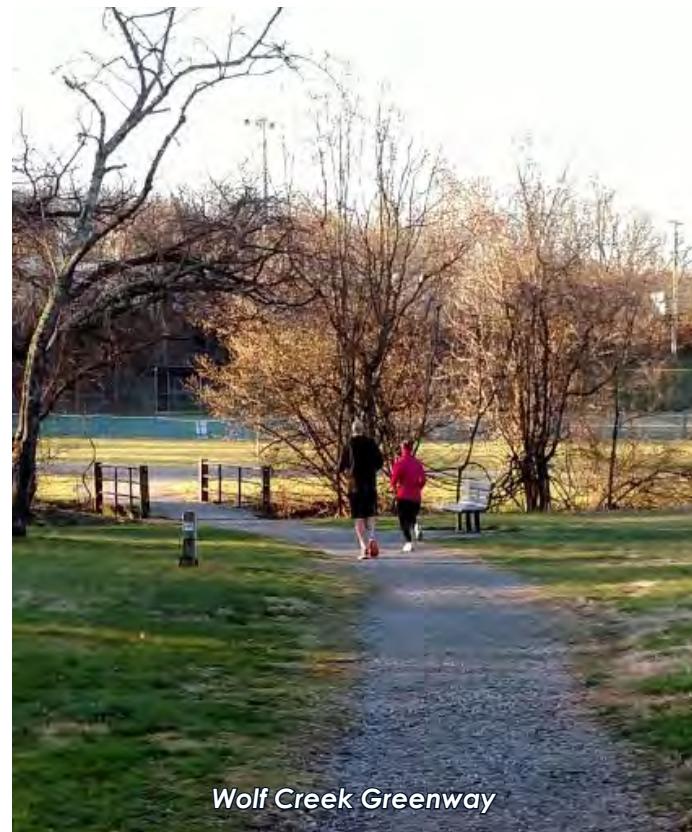
- Oak Grove Pedestrian Improvements, Route 419 at Carriage Lane and Grandin Road (completed in 2023)
- Pedestrian Crossing Improvements, Route 419 at Keagy Road South (completed in 2023)
- Plantation Road Bicycle, Pedestrian and Streetscape Improvement Project, Phase 1 (Completed 2018)
- Plantation Road Bicycle, Pedestrian and Streetscape Improvement Project, Phase 2 (Completed 2022)
- Route 419 Pedestrian Crossing improvements, Brambleton Avenue and Postal Drive (funded)
- Route 419 Safety Improvements, Stoneybrook Drive to Grandin Road Extension (funded)
- Route 419 Streetscape Improvements, Starkey Road to Ogden Road (funded)
- West Main Street Pedestrian Improvements, Phase 1 (Completed 2014)
- West Main Street Pedestrian Improvements, Phase 2 (Completed 2021)
- Williamson Road Pedestrian Safety Improvements, Peters Creek Road to North Roanoke Assisted Living (Completed 2021)
- Williamson Road Pedestrian Improvements, Peters Creek Road to Plantation Road (Completed 2024)
- Williamson Road Pedestrian Improvements, Plymouth Drive to North Roanoke Assisted Living (funded)

6.8 Greenways & Trails



Some or all of five greenways run through Roanoke County: Wolf Creek Greenway, Mudlick Creek Greenway, Roanoke River Greenway, Hanging Rock Battlefield Trail, and Tinker Creek Greenway. All in all, there are approximately 4.25 miles of greenway in Roanoke County. Roanoke County Parks, Recreation and Tourism operates and maintains all greenways within Roanoke County.

Roanoke County is a member of the Roanoke Valley Greenway Commission, and constantly coordinates with the other member jurisdictions on greenway matters. The regional collaboration facilitated by the Greenway Commission is essential, as greenways stretch across multiple localities and are among the region's most popular recreational destinations. This popularity brings with it constant calls for expansion and increasing maintenance challenges. The Roanoke County greenway network is set to expand rapidly,



Wolf Creek Greenway

as approximately five miles of greenway are set to be constructed in the next three years in the form of the following funded projects:

- Glade Creek Greenway Through Vinyard Park West
- East Roanoke River Greenway, Blue Ridge Parkway Crossing at Highland Road
- East Roanoke River Greenway, Explore Park
- East Roanoke River Greenway, Highland Road to Explore Park
- West Roanoke River Greenway, Kingsmill Drive to Riverside Nursery

Wolf Creek Greenway

The 2.2-mile Wolf Creek Greenway is a cinder-surface greenway located in the Town of Vinton and Roanoke County. The 0.6-mile Town of Vinton section was completed in 1999, and the 1.6-mile Roanoke County section was completed



Mudlick Creek Greenway - Garst Mill Park

in 2006. The Wolf Creek Greenway is Roanoke County's most popular greenway. In 2021, it had nearly twice as many visitors as the second most popular greenway in Roanoke County (Roanoke River Greenway at Green Hill Park). During public outreach for this plan, feedback about the Wolf Creek Greenway exclusively took the form of requests for additional capacity on, or access to, the greenway.

Mudlick Creek Greenway - Garst Mill Park

The half-mile section of the Mudlick Creek Greenway at Garst Mill Park was constructed in 1997 and was the first greenway constructed in the Roanoke Valley. It is the only constructed section of the Mudlick Creek Greenway, which is proposed to run 4.9 miles and would connect the Roanoke River Greenway to Cave Spring Middle School and the proposed Back Creek Greenway. Numerous neighborhood connections make this paved-surface greenway a popular destination for area residents.



Roanoke River Greenway - Connection to Highland Road

Roanoke River Greenway - Green Hill Park

This 0.8-mile greenway in western Roanoke County's Green Hill Park was the first section of the Roanoke River Greenway to be constructed in Roanoke County. This paved-surface greenway opened in 2008, and is Roanoke County's second-most-popular greenway, after the Wolf Creek Greenway. It connects at its western terminus to a 2.2-mile network of hiking and mountain biking trails running up the north face of Green Hill.

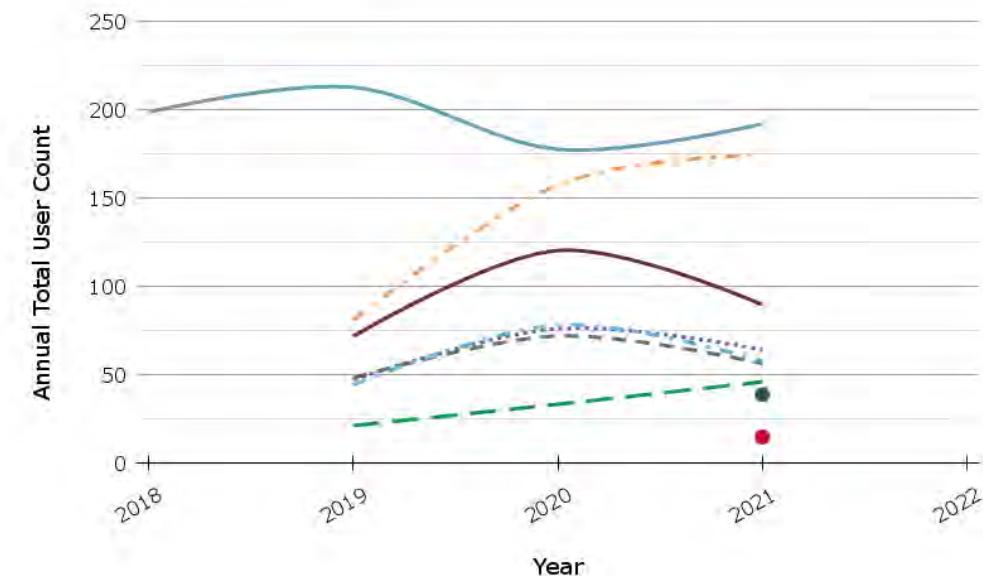
Roanoke River Greenway - Connection to Highland Road

This 0.4-mile greenway, the first section of the Roanoke River Greenway to be constructed in eastern Roanoke County, was completed in August 2023. This paved-surface greenway runs south-to-north from a new trailhead parking lot on Highland Road towards the Roanoke River and Niagara Dam. It sits entirely on Virginia Recreational Facilities Authority (VRFA) property.

Roanoke County Greenway & Trail Annual Total User Counts

2018 - 2021

- Appalachian Trail/ McAfee's Knob
- Carvins Cove at Timberview Area
- Carvins Cove at Bennett Springs Area
- Wolf Creek Greenway at Goode Park
- Hanging Rock Battlefield Trail
- Tinker Creek Greenway at Hollins Trailhead
- Roanoke River Greenway at Green Hill Park
- Catawba Greenway
- Hinchee Trail



Hanging Rock Battlefield Trail

The Hanging Rock Battlefield Trail is a 2.2-mile paved and cinder-surface greenway that runs alongside Kessler Mill Road in the City of Salem and Roanoke County. One and a half miles are located in Salem and 0.7 mile is located in Roanoke County. The first section of the greenway constructed, which was the 1.5-mile cinder-surface section between Branch Drive and the Hanging Rock Battlefield, was opened in 1999. In 2023, a 0.7-mile paved section was completed, extending the greenway from Branch Drive to East Main Street.

The Hanging Rock Battlefield is where in 1864, during the American Civil War, Confederate cavalry briefly engaged with a Union column that was retreating from Lynchburg to Lewisburg, WV. The Hanging Rock Battlefield is also where the Hanging Rock Battlefield Trail connects to Roanoke County's Hinchee Trail, which connects to the Carvins Cove Trail Network. Trailhead parking lots are located at the Hanging Rock Battlefield, Kessler Mill Road at Branch Drive, and East Main Street at Kessler Mill Road.

Tinker Creek Greenway

This 2.2-mile natural surface trail is the only section of the Tinker Creek Greenway that has been constructed to date in Roanoke County or Botetourt County. It connects Hollins University to the Carvins Cove boat ramp and is a popular hike for Hollins University students.

Federal Trails

Two federally operated trail networks pass through Roanoke County: The Appalachian National Scenic Trail and the Blue Ridge Parkway Trails (see map on pages 6-52 and 6-53) The Appalachian National Scenic Trail (AT) runs 2,190 miles between the summit of Springer Mountain in Georgia and the summit of Mount Katahdin in Maine. The brainchild of planner and forester Benton McKaye, the AT was completed in 1937 after fourteen years of work. Today the trail is managed by "the National Park Service, U.S. Forest Service, Appalachian Trail Conservancy, numerous state agencies and thousands of volunteers" (U.S. National Park Service, 2023). The Roanoke Appalachian Trail



Club maintains the trail in the vicinity of Roanoke – 120 miles in all between Botetourt and Bland counties.

Nearly seventeen miles of the AT are located in Roanoke County, and Roanoke County's two most popular day hikes – McAfee Knob and Dragon's Tooth – are located on the AT. The trailhead parking lots at both locations are too small to accommodate the crowds that these hikes draw on weekends, especially in the fall. Roanoke County has coordinated extensively with the National Park Service about parking issues at McAfee Knob and will continue to do so. In Fall 2022, Roanoke County launched the McAfee Knob Trailhead Shuttle to help accommodate hiker demand.

Funding has also been secured for a pedestrian bridge to replace the AT's at-grade crossing of Route 311 at the McAfee Knob trailhead parking lot. This will vastly improve safety at this location, as the posted speed limit of Route 311 is 55 miles per hour, and sight distance is minimal for both hikers crossing Route 311 on the AT and drivers approaching the Appalachian Trail crossing on Route 311.

The McAfee Knob and Dragon's Tooth trail networks both contain additional trails which fall under federal jurisdiction but are not part of the AT: The McAfee Knob Fire Road, Dragon's Tooth Trail, Dragon's Tooth Spur, and Boy Scout Trail. The North Mountain Trail, which runs nearly fourteen miles along the ridgeline of North Mountain, also connects at its western terminus to Route 311 near the Dragon's Tooth parking area. The North Mountain Trail joins with the Dragon's Tooth Trail, the Appalachian Trail, and the Andy Layne Trail to form the Virginia's Triple Crown Loop, a 35-mile hiking loop that includes Dragon's Tooth, McAfee Knob, and Tinker Cliffs.

The Blue Ridge Parkway also maintains trails for hiking and horseback riding in Roanoke County. There are approximately 7.5 miles of trail on Blue Ridge Parkway property in Roanoke County. These trails are mostly flat and do not lead to stunning views like McAfee Knob or Dragon's Tooth. For this reason, they draw less traffic than the trails in the vicinity of the Triple Crown Loop. The 2011 Roanoke Valley/Blue Ridge Parkway Trail Plan calls for all the trails to eventually be connected and run between Stewart's Knob and U.S. Route 220 (save for one gap at the Roanoke River bridge).

State Trails

Over four miles of trail are located at the Poor Mountain Natural Area Preserve, a 1,404-acre preserve in southwestern Roanoke County that is operated by the Virginia Department of Conservation and Recreation (see map on pages 6-52 and 6-53). These trails pass through the largest concentration of Piratebush (*Buckleya distichophylla*) in the world, which is a rare shrub that grows only in the mountains of southern Virginia, eastern Tennessee, and western North Carolina (Virginia DCR, 2021; Virginia Tourism Corporation, 2024). This is a moderately popular local destination, but it cannot accommodate large crowds as there are only ten parking spaces at the trailhead parking lot and the topography precludes both spillover parking and the expansion of the parking lot.

Over fourteen miles of trail are located at the Havens Wildlife Management Area, a 7,190-acre Wildlife Management Area (WMA) in northwestern Roanoke County that is operated by the Virginia Department of Wildlife Resources (DWR). The Havens WMA occupies much of Fort Lewis Mountain, and ranges from 1,500 to 3,200 feet in elevation. Visitors must purchase an Access Permit from DWR to access the Havens WMA. Hunting is permitted in the Havens WMA, so hikers should exercise caution during hunting season. Trailheads are located off of Bradshaw Road and Wildwood Road.

Local Trails

Roanoke County Parks and Recreation maintains numerous trails throughout Roanoke County. These trails are spread fairly evenly throughout the County, as ten of eleven Community Planning Areas have local trails that can be accessed from within their boundaries (see map on pages 6-52 and 6-53). The most extensive trail network maintained by Roanoke County is located at Explore Park, with over five miles of trails for hikers and mountain bikers of all skill levels. Roanoke County evaluates and regularly pursues opportunities to expand and improve the Explore Park trail network.

Another crown jewel among Roanoke County-maintained trail networks is the Read Mountain Preserve. Approximately 4.5 miles of trail are located at the Read Mountain Preserve, and multiple locations along the trails feature expansive views of the Roanoke Valley. Roanoke County purchased a large portion of the north side of Read Mountain in 2019.

The Carvins Cove Natural Reserve, though within the boundaries of Roanoke County and Botetourt County, is owned and operated by the City of Roanoke. Over 60 miles of trails for hiking, mountain biking, and horseback riding are located at the Carvins Cove Natural Reserve.

Ultimately, most Roanoke County-owned trails are short trails at neighborhood parks. Eight of fourteen local trail networks contain less than one-half mile of trails.

6.9 Rail



Railroad tracks cross the entire length of Roanoke County from east to west, and also run south along Route 220. Both freight and passenger trains pass through Roanoke County.

Freight Rail

Roanoke County has a well-established freight rail network that is utilized by a number of industries for the shipment of goods and materials. The location of the County's rail infrastructure near major transportation hubs, such as highways and airports, make it an attractive location for businesses that rely on efficient and reliable freight transportation. Roanoke has two major Norfolk Southern freight rail corridors passing through it. These include the Crescent Corridor and the Heartland Corridor. The Crescent Corridor is Norfolk Southern's primary north-south corridor which parallels I-81, providing freight services between the Northeast and Southeast U.S. markets. The Heartland Corridor is Norfolk Southern's primary east-west route, and parallels U.S. Route 460 to connect the Port of Virginia and major markets in the Midwest. Overall, Norfolk Southern has nearly 22,000 route miles

connecting all major markets east of the Mississippi River, with Roanoke located near the center of its rail corridors.

The history of freight rail in Roanoke is closely tied to the development of the Norfolk and Western Railway (N&W), which played a significant role in the industrial and economic growth of the region. The N&W was formed in 1881 when the new owners of the Atlantic, Mississippi, and Ohio Railroad (AM&O) changed the name of the railroad to the Norfolk & Western Railway. The new owners then decided to move the railroad's headquarters from Lynchburg to Roanoke (known as Big Lick at the time). After the name change and relocation to Roanoke, the N&W quickly became one of the largest railroads in the United States.

In the early years, N&W focused on transporting coal from the coalfields of Virginia, West Virginia, and Kentucky to ports on the East Coast. N&W invested heavily in improving its infrastructure, including building new rail lines, upgrading its locomotives, and constructing modern facilities for maintenance and repair. As the coal industry grew in the region, N&W expanded its operations to include other types of freight, such as iron and steel products, timber, and agricultural goods. They also played a key role in transporting troops and supplies during both World War I and World War II.

In the mid-20th century, the rise of the interstate highway system and the decline of the coal industry had a major impact on N&W and other



Assembly of a Norfolk & Western Locomotive in Roanoke, 1950. Credit: Classic Trains

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railroads in the region. However, N&W was able to adapt by diversifying its business and developing new sources of revenue, like container shipping and intermodal transport.

Today, N&W is part of the Norfolk Southern Corporation, which continues to operate in the Roanoke area and is a major employer and economic driver for the region. The Virginia Museum of Transportation, located in the City of Roanoke, is an excellent source for a deeper dive into the history of the railroad and its contributions to the area.

The proliferation of rail in the Roanoke Valley has offered many great benefits, such as cost-effective transportation, particularly over long distances. The ability for trains to carry large volumes of cargo long distances at once allows them to spread out the fixed costs of transportation over a larger number of goods. Rail is also one of the most energy-efficient modes of transporting freight, so it produces less emissions of greenhouse gases and other pollutants. It also reduces traffic congestion on highways and other major transportation routes, as it reduces the number of tractor-trailers on highways. In addition, rail is considered to be a safer mode of transportation, as railroads have rigorous safety protocols in place to prevent accidents and theft. Rail can transport a wide variety of goods that may be much more difficult to transport via other methods.

Freight rail does, however, come with its concerns. Safety is a major concern among those who live or work near active railroad tracks. While the County has little influence on the internal safety measures on day-to-day operations of Norfolk Southern, it does have the ability to influence some of the external safety concerns that result from interaction between other transportation types and the railroad.

Freight Rail Safety

In October 2020, a coal train derailed on a bridge over the Roanoke River and Barley Drive in western Roanoke County. In all, twenty-six cars were derailed, and sixteen cars carrying approximately

2,600 tons of coal ended up in the Roanoke River. About half of the coal was removed from the river by Norfolk Southern in the weeks following the derailment, but heavy rain and the high level of the river during that time meant that almost 1,300 tons of coal were swept downstream. On March 10, 2023, Norfolk Southern was issued a \$27,000 fine by the Virginia Department of Environmental Quality (VDEQ) for this incident.

About one month before Norfolk Southern was fined for the Roanoke River incident, a far more disastrous train derailment occurred in East Palestine, Ohio. The East Palestine derailment, which resulted in well over one million pounds of toxic chemicals burning over multiple days and the evacuation of approximately half of the town's 5,000 residents, thrust the issue of freight rail safety to the forefront of the national consciousness. On March 1, 2023, the Federal Rail Administration announced a rigorous new inspection program for tracks and railroads carrying high-hazard flammable trains (HHFTs) like the train that derailed in East Palestine, or other trains carrying large volumes of hazmat commodities. In May 2023, the U.S. Senate Committee on Commerce, Science, and Transportation approved the bipartisan Railway Safety Act, which would strengthen rail safety requirements, improve train car inspections, increase standards for transporting hazardous materials, give more support to first responders and increase penalties on rail companies for wrongdoing. If signed into law the Railway Safety Act, which as of January 2024 awaits vote in the Senate, would decrease the frequency of events like the Roanoke River and East Palestine derailments, and bring increased restitution to the communities that are faced with them.

Norfolk Southern freight trains can be extremely long, sometimes over 2 miles in length, and this can bring about additional safety issues. For instance, it is sometimes impossible for trains that long to stop without blocking at least one at-grade road crossing. This frequently occurs in the Bonsack area of Roanoke County, where there are two different neighborhoods that can only be accessed via an at-grade crossing of railroad tracks. Preliminary

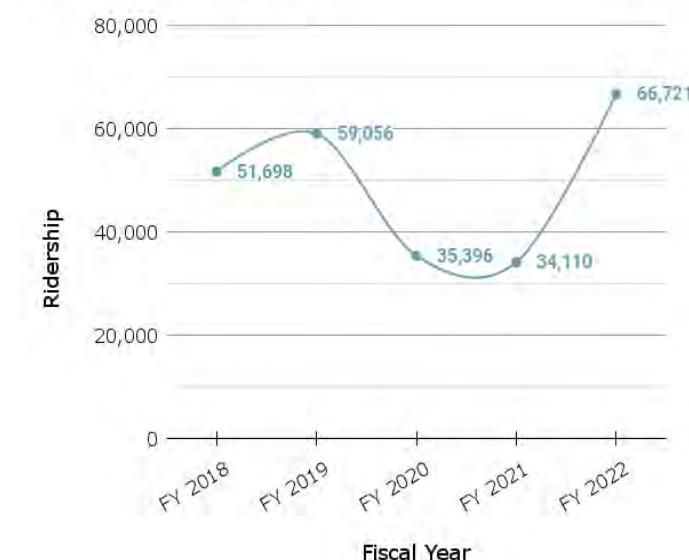
engineering reports for grade separation projects at both crossings – on Glade Creek Road and Layman Road – were completed in January 2022 as part of the Route 460 Land Use and Connectivity Study. In October 2022, Roanoke County applied for funding to conduct planning, environmental review, and design of grade separation projects for both intersections in the inaugural cycle of the Railroad Crossing Elimination Grant Program (RCE) but was not awarded funding. Future RCE cycles may be less competitive, though, if the highest priority projects are awarded funding in early cycles and removed from the application pool.

Passenger Rail

Roanoke County, like the rest of the Roanoke Valley, is served by the Amtrak station in downtown Roanoke. Amtrak's Northeast Regional route stops in Roanoke seven days a week. This service began in October 2017, ending nearly 40 years without passenger rail in Roanoke. In July 2022, a second

Amtrak Ridership

Roanoke, VA Station (RNK)



Roanoke Amtrak Station at dusk, Credit: Visit Virginia's Blue Ridge

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train began running to and from Roanoke each day. Before the COVID-19 pandemic, ridership to and from the Roanoke station was increasing at a faster rate than at any other station in Virginia. After a two-year lull during the pandemic when ridership dipped to a little over half of pre-pandemic levels, ridership in FY 2022 surged back to an all-time high of 66,721.

In May of 2021, then-Governor Ralph Northam announced that the Northeast Regional line would be extended to Christiansburg. To accomplish this, a Norfolk Southern-owned track between Salem and Christiansburg (the former Virginian line) was purchased in 2022 by the Virginia Passenger Rail Authority, a new agency created by the Virginia General Assembly in 2020.

Passenger Rail Safety

Passenger rail brings safety concerns and planning challenges that are distinct from those associated with freight rail. In 2025, Amtrak service to Christiansburg is expected to begin, and when it does, Amtrak trains will pass through western Roanoke County. Passenger trains are faster and quieter than freight trains, so people notice the presence of passenger trains later, and have less time to react when they do. Western Roanoke County is mostly rural, and some residents cross the train tracks on agricultural equipment or other modes of transportation that move at much slower speeds than automobiles. Due to the higher speed and lower noise output of passenger trains, those crossing the tracks on agricultural equipment may need more sight distance to safely cross the tracks than they are afforded at the crossings they currently use. For this reason, VPRA is working with property owners to limit the number of crossings available in western Roanoke County to those that can meet strict safety standards.

Emergency evacuation routes are required for tracks that carry Amtrak trains, and these will need to be established in western Roanoke County before service to Christiansburg can begin. There is potential for Roanoke County to construct portions of the Roanoke River Greenway that could serve as emergency evacuation routes for Amtrak in western Roanoke County.

6.10 Air



Roanoke County, like the rest of the Roanoke Valley, is served by the Roanoke-Blacksburg Regional Airport (ROA) in the City of Roanoke. The airport is owned and operated by the Roanoke Regional Airport Commission. Scheduled passenger flights began at the Airport in 1934. Four airlines currently offer flights in and out of ROA:

- Allegiant Air
- American Airlines
- Delta Air Lines
- United Airlines

Direct flights are offered to nine cities:

- New York
- Philadelphia
- Washington, D.C.
- Charlotte
- Orlando
- St. Petersburg
- Atlanta
- Nashville
- Chicago

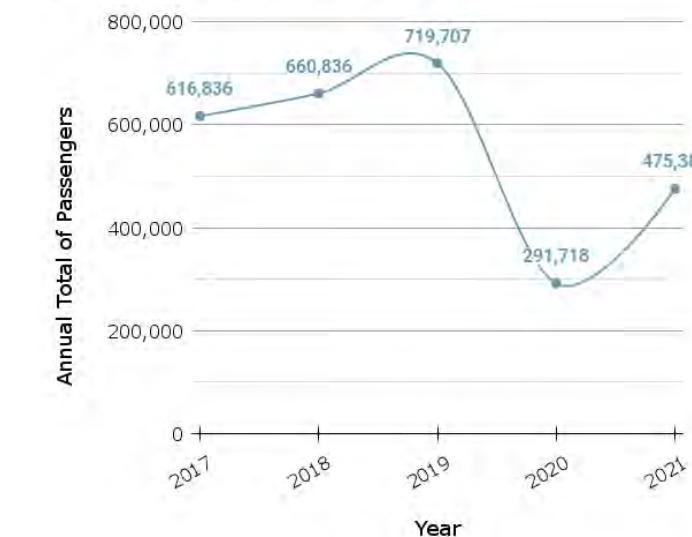
Approximately forty passenger flights arrive or depart at ROA every day. Ridership on passenger flights declined dramatically during the COVID-19 pandemic but is moving towards pre-pandemic levels.

Cargo traffic declined only slightly during the COVID-19 pandemic, as people were still able to shop online during that time and has already fully returned to pre-pandemic levels.

Airports bring planning challenges, as they generate noise, and the heights of structures must be limited within a certain radius. To address these challenges, Roanoke County has implemented

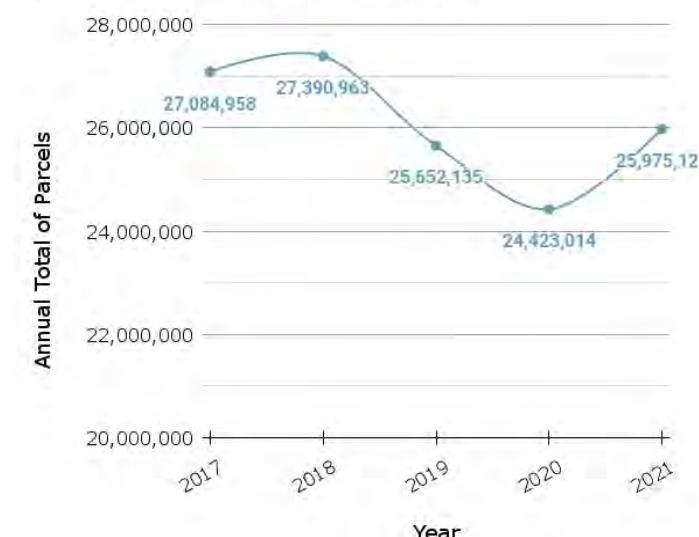
Airline Passengers

Roanoke-Blacksburg Regional Airport (ROA)



Airline Cargo

Roanoke-Blacksburg Regional Airport (ROA)



the Airport Overlay District, which limits structure heights along flight takeoff and landing paths, and has applied the Principal Industrial Future Land Use designation to the part of the County north of the airport that is impacted by flight noise.

Expansion of at least one of the airport's two runways has long been discussed by the Airport Commission and localities of the Roanoke Valley as the runways, at 5,810 feet and 6,800 feet, are currently not long enough to accommodate Boeing 737s or Airbus A320s for passenger flights. It is possible that a runway expansion would extend one of the existing runways into Roanoke County. If the runway is extended into Roanoke County, the County would need to expand the boundary of the Airport Overlay District to ensure that structures are not built in a way that could interfere with flight paths and could consider amending the future land use map to mitigate the impacts of flight noise.

Roanoke County recognizes the economic development and quality of life benefits that the airport brings to the Roanoke Valley.

6.11 New & Future Technology in Transportation

 Advancements in transportation technology are constant. It is important to provide flexibility to accommodate these advancements when and where appropriate.

Electric Vehicles & Charging Stations

Electric vehicles (EVs) are becoming an increasingly popular mode of transportation. Potential benefits of EVs include improved safety, fewer maintenance needs, lower operating costs, and less environmental impact compared to gas-powered vehicles. These benefits make EVs an attractive option for people who are looking for an efficient and cost-effective mode of transportation.

However, with these benefits in mind, it is important to remember that EVs have drawbacks and

there are issues that must be addressed for EVs to achieve widespread adoption, including:

- Limited driving range: Most existing EVs need to be recharged far more often than gas-powered cars need to be refilled with gas.
- High upfront cost: Despite the lower operating costs of EVs, the upfront cost of purchasing an EV is still higher than that of traditional gasoline-powered vehicles.
- Limited charging infrastructure: In some areas, the charging infrastructure is still limited, making it difficult for EV owners to find a convenient place to charge their vehicles.
- Long charging time: While fast charging is becoming more widely available, the time required to charge an EV is still longer than the time required to refuel a gasoline-powered vehicle.
- On-demand reliability: The reliability of EVs during any type of power outages where electricity is not readily available is a common concern.

To prepare for an increased number of EVs in the future, Roanoke County can take several steps. These steps could include installing public charging stations, adopting new regulations focused on increasing charger availability, or cooperating with energy providers to plan for grid upgrades to ensure the electrical grid can support increased demand for electricity.

Expanding Electric Vehicle Charging Infrastructure

EV charging infrastructure is an important component of the transportation ecosystem, and there are three main types of charging infrastructure:

- Level 1 (120V) – Slow charging that is typically used for overnight charging at home



EV Chargers at Cave Spring Corners

- Level 2 (240V) – More powerful charging that is used for both home and public charging
- DC Fast Charging (DCFC) – Fastest charging, used for quick charges during long-distance travel

Roanoke County could play a role in supporting the expansion of EV charging infrastructure by offering incentives for installation, streamlining permitting and regulations, prioritizing charging infrastructure in planning, supporting public charging stations, and partnering with utilities. Providing more EV charging opportunities will benefit citizens currently using EVs and business owners who would gain customers from travelers stopping in the area to charge their vehicles.

There are growing numbers of state and federal grant programs that support the installation of EV charging infrastructure that offer the opportunity to leverage funding for the potential installation of charging stations in convenient locations.

One of the key efforts to increase EV ranges is the development of solid-state batteries. These batteries offer increased charge capacity in a smaller package, faster charging times, and improved safety.

The charging technology for EVs is also quickly adapting. An example of this is the development of a high-speed 350 Kw charger which allows vehicles to be charged in minutes rather than hours. This offers a great reduction in the planning necessary when deciding when or where to charge your vehicle. If located near retail use, these chargers could help attract potential shoppers who could quickly charge their vehicle while visiting a store or restaurant.

Electric Mobility Devices

E-bikes, E-scooters, and other electric mobility devices are rapidly gaining popularity as a means of transportation in urban and suburban areas. These devices are powered by batteries and use electric motors to assist the rider, making

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it easier and more convenient to travel. These devices are often seen as a more sustainable and environmentally friendly alternative to cars for short trips.

E-Bikes and E-Scooters

Currently, E-bikes and E-scooters are widely available for rent or purchase. Their convenience and low cost makes them a popular option for short trips.

According to the Virginia State Code, E-bikes are classified into three categories: Class 1, Class 2, and Class 3.

- Class 1 E-bikes are pedal-assist bikes that provide a boost to the rider's pedaling effort. These E-bikes have a motor that provides assistance when the rider is pedaling and stops providing assistance when the rider reaches a speed of 20 miles per hour (mph).
- Class 2 E-bikes are throttle-control bikes that can be powered without pedaling. These E-bikes have a motor that provides power to the bike through a throttle, similar to the acceleration control of a motorcycle, and have a maximum assisted speed of 20 mph.
- Class 3 E-bikes are pedal-assist bikes that provide a boost to the rider's pedaling effort and have a speedometer that displays the speed of the bike. These E-bikes have a motor that provides assistance when the rider is pedaling and stops providing assistance when the rider reaches a speed of 28 mph.

E-scooters are designed for short distances of travel and are typically used for short commutes, for traveling in urban settings, or for recreation. They are similar in appearance to traditional kick scooters but are equipped with an electric motor and a rechargeable battery that provides power to the scooter to propel it forward rather than relying on the rider. E-scooters can reach speeds of up to 15-20 mph. They are often rented through mobile apps and are available for pick

up and drop off throughout the areas which they are permitted. E-scooter rental programs typically operate on a dock-less basis, meaning, they are not rented or dropped off at a fixed location. This is highly convenient for users but raises some concerns about clutter and conflicts with other infrastructure and uses.

Other Electric Mobility Devices

There are several other types of electric mobility devices on the market which offer similar benefits to those offered by E-bikes and E-scooters. Some examples include electric skateboards, hoverboards, electric unicycles, and electric kick scooters. Electric skateboards are electrically propelled, allowing for longer distances and higher speeds of travel than traditional skateboards.

Hoverboards are self-balancing scooters that use two parallel wheels and an electric motor that compensates for balance to propel it forward. Electric unicycles are similar to hoverboards, the only differences being that they only use one wheel instead of two, and they contain features which compensate for the balance of the rider. Electric kick scooters are traditional kick scooters with added electric power to assist rather than acting as the sole power supply. While these electric mobility devices are convenient and cost-effective, they also raise concerns about safety and regulation, and even some concerns about environmental impact.

Concerns About Electric Mobility Devices

Some of the concerns of both riders of electric



mobility devices and the general public include safety, regulation, parking, and natural surface trail damage. Safety is a major concern for these devices, as they can travel at higher speeds than manually-powered bikes and scooters. This can lead to crashes involving users of these devices and users of manually-powered transportation modes, in which the electric mobility device user is likely traveling faster and using heavier equipment than the manually-powered device user. Another major concern is regulation, as these devices are not regulated in the same way as cars or bicycles, leading to confusion for both electric mobility device users and other road, shared use path, and trail users. The issues surrounding dock-less parking of electric mobility devices are also of major concern, especially in urban areas where public spaces are limited and transportation routes such as sidewalks are crowded. The potential impacts on natural surface trails from the increased use of electric bikes and other off-road electric vehicles is another common concern surrounding these devices. To address these concerns, it is important for the manufacturers of these devices, rental program operators and local governments to work together to develop regulations and guidelines for safe and responsible use.

The Future of Electric Mobility Devices

It is expected that E-bikes, E-scooters, and other electric mobility devices will continue to be popular modes of transportation in the Roanoke Valley and beyond. It is very likely they will continue to evolve and become more advanced. As this expanded use occurs it is important to keep in mind the many concerns surrounding these devices so the County can better plan for their safe and effective use.

Autonomous Vehicles

Autonomous Vehicles (AVs) are already on the road, and over time the technology will progress towards "self-driving" cars that can navigate anywhere with little to no assistance from humans. As cars can incorporate different levels of automation, experts have historically separated autonomous vehicles into five levels. A breakdown of these levels can be viewed in the table on page 6-68.

Levels of Automation in Autonomous Vehicles

Automation Level	ADAS or ADS	Automated System Capability	Driver's Role	System's Role	Vehicle Feature Examples
Level 0	Neither	No system present	All driving functions at all times	None	None
Level 1	ADAS	Assist steering OR acceleration/deceleration	All driving functions with limited assistance	Some assistance with steering or acceleration/braking but not both at the same time	Adaptive cruise control, lane departure warning, collision warning, automated emergency braking
Level 2	ADAS	Simultaneously assist steering and acceleration/deceleration	Can engage part-time assistance but must monitor driving at all times	Assists driver with steering and acceleration/braking at the same time	Level 1 plus lane keeping assist, collision avoidance, parking assist
Level 3	ADAS/ADS	Partial autonomous driving	Must be ready to take control when system requests	Conditional autonomous driving	Level 2 plus highway driving, traffic jam assist, remote park, driver monitoring
Level 4	ADS	Highly autonomous driving	Limited need to take control	Autonomous driving in most circumstances	Level 3 plus geo-fenced urban driving, valet parking
Level 5	ADS	Fully autonomous driving	None	All functions at all times.	No driver controls needed

Lower-level AVs utilize an “advanced driver assistance system” (ADAS) to assist drivers, while higher-level AVs will utilize an “advanced driving system” (ADS) to actually drive the car. Vehicles utilizing ADAS are already on Roanoke County roads, and it is likely that some vehicles utilizing ADS will be on Roanoke County roads by 2038. Long-haul tractor-trailers and ride sharing services will likely incorporate ADS first, but by 2038 there is also a strong chance that there will be some privately-owned ADS passenger cars on Roanoke County roads. McKinsey & Company predicts that in 2030, between 4% and 20% of new automobile sales will be Level 3 or above AVs and by 2035 between 17% and 57% will be Level 3 and above AVs (Deichmann, et al, 2023). A Level 3 AV built by Honda has been available to the public in Japan since 2021.

Vehicles with ADS will change driving patterns. They will likely increase vehicle miles traveled, as people will tolerate longer trips if they are not driving, but they also have the potential to reduce traffic and crashes as the ADS systems will be able to coordinate movements with one another (Wang & Wu, 2021). However, these congestion and safety benefits will likely not be realized while automated and human-operated cars share the roads (Schaller, 2017). The widespread adoption of ADS will reduce the need for parking, as vehicles will be able to circulate rather than needing to park, but this could ultimately offset any reduction in congestion brought about by ADS (Wang & Wu, 2021; Millard-Ball, 2019). New “attendant” jobs will likely be created at the mega-truck stops that will likely serve automated trucks (D’Orazio, et al, 2020).

Roanoke County will need to monitor new developments in AV technology, and work to plan for them so that their positive effects can be maximized, and their negative effects minimized.

Not only will AVs be able to communicate with each other, they will eventually be able to communicate with roads, traffic lights, and potentially many other objects through the use of Vehicle-to-Everything (V2X) technology. V2X represents the logical conclusion of Intelligent

Transportation Systems (ITS), which are currently used to collect and deliver traffic information to motorists, provide automated enforcement of speed limits in some locations, and outfit some roadways with variable speed limits, among other things. With V2X, traffic lights would alter their signal phases to accommodate emergency vehicles, and cars would be alerted to roadway hazards and automatically re-routed. Widespread use of V2X will require infrastructural updates, including both deployment of new infrastructure and significant upgrades to existing cellular networks. Some of these updates will likely take place in the next fifteen years, as the draft V2X deployment plan released by USDOT in October 2023 includes the ambitious goal of V2X deployment across the entire National Highway System and at 75% of public intersections by 2034 (USDOT, 2023).

Delivery Drones

The use of drones for delivery has the potential to greatly transform the transportation of goods. Air and ground drones for smaller parcel delivery currently have the most growth potential in this sector. These delivery systems are being used for many types of delivery including commercial delivery, and the technology is expected to expand. They have the potential to greatly reduce delivery time, as well as reduce the number of delivery vehicles currently on the road (Lyon-Hill, et al., 2020).

Aerial Delivery Drones

Aerial delivery drones are typically equipped with multiple rotors and can fly autonomously using GPS navigation. They can be used to deliver packages, medical supplies, or other goods to remote or hard-to-reach locations or for fast last mile delivery.

Some of the companies that are currently using aerial delivery drones include Amazon Prime Air, UPS Flight Forward, Walmart DroneUp and Wing Aviation. Wing Aviation currently works with Virginia Tech to make deliveries within a four-mile radius of its headquarters to citizens in Montgomery County. Wing Aviation offers delivery from Walgreens, FedEx and some local businesses.

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Ground Delivery Drones

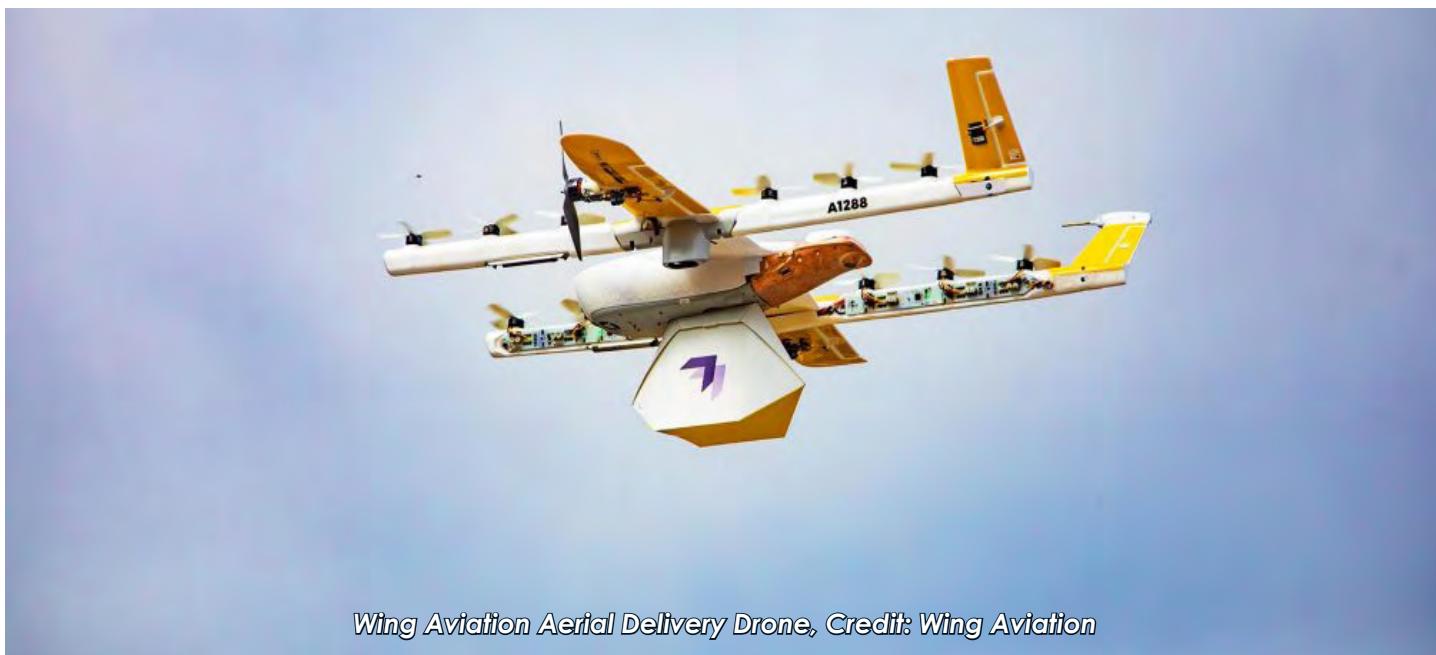
Ground delivery drones are typically four-wheeled unmanned vehicles that operate on pedestrian amenities to deliver packages to customers in residential areas, where aerial delivery is not feasible. Ground delivery drones can also be used for transporting goods within warehouses or industrial complexes. Some companies with aspirations to expand ground drone deliveries include Amazon, Google, and even Domino's pizza using the unmanned vehicle Nuro R2.

Considerations for Effective Adoption of Delivery Drones

Both aerial and ground delivery drones have gained popularity in recent years due to their speed, efficiency, and ability to reduce the cost of last-mile delivery. However, there are still some challenges that need to be addressed, such as regulations, privacy concerns, and security issues.

The following should be considered in the future planning for drones and supporting infrastructure:

- Market demand: The demand for drone delivery services should be assessed to ensure that Roanoke County is staying up



Wing Aviation Aerial Delivery Drone, Credit: Wing Aviation

to date with the needs of its residents to prepare for the potential adoption of this service.

- Regulations: Federal, state, and local regulations regarding drone operation, safety, and privacy should be reviewed or created and updated as necessary to ensure the safe and responsible use of drones if this technology were to expand and become commonplace within the community.
- Public education and outreach: If this technology were to expand into Roanoke County, Public education and outreach programs should be established to raise awareness about the benefits and responsible use of drones, and to gather feedback and concerns from citizens on the potential use of delivery drones.
- Collaboration with private and public sector: Collaboration between the private and public sector should be encouraged to stay up to date on the potential development and deployment of drone delivery services and related infrastructure.

It is important to consider these, along with any other factors that present themselves during the rollout of this technology in and around Roanoke County. This will offer the ability to address any concerns associated with this technology and to create a transportation system that is efficient, convenient, and sustainable for both residents and businesses located in the Roanoke Valley.

Electric Vertical Takeoff and Landing Aircraft

Electric Vertical Takeoff and Landing Aircraft (eVTOLs) or "flying taxis" are essentially super-sized drones that can carry human passengers. They hover, take off, and land vertically, like drones. Prototypes are mostly fully electric (but some are hybrid-electric), have a top speed of 62 to 250 miles per hour, a range of 17 to 500 miles, a cruising altitude of 1,000 to 5,000 feet, and a passenger capacity of one to four. NASA anticipates that eVTOLs will be a commercially viable transportation option in the U.S. by 2028, but rollout could begin sooner. They will likely be used at first for transport between suburbs and city centers and transport to and from airports in large metro areas. There is not much need for these types of trips within the Roanoke Valley, but eVTOLs could be used for trips to and from the New River Valley.

Helicopters are not in danger of being replaced by eVTOLs for emergency medical services in the near future, as helicopters still provide greater range and flexibility for transporting payloads of different sizes than eVTOLs (Cowan, 2019). In the short term, eVTOLs could unburden helicopters from lower-weight, shorter-distance trips like organ transport. In the long term, advances in battery technology may come which would increase the range of eVTOLs and allow them to compete more directly with helicopters.

The FAA does not allow aircraft to fly below 1,000 feet in "congested areas" or below 500 feet in "other than congested areas," but helicopters can fly below these altitudes as long as they stay on specific routes. It is likely that during the early years of eVTOL adoption, eVTOLs will fly on these defined helicopter routes. As adoption increases, though, eVTOLs may need to be separated from helicopters and given their own routes.

eVTOLs can take off and land at both permanent and modular stations. Both types of stations can be very compact. Planners will need to consider the implications of eVTOLs taking off and landing at permanent "vertiports" in densely developed areas, and of eVTOLs flying in and out of modular "vertipads" on more isolated private property.



Joby Aviation eVTOL prototype, Credit: Joby Aviation

6.12 Conclusion

 It is impossible to predict the exact challenges that will be faced by the Roanoke County transportation system over the next fifteen years. It is certain, however, that new challenges will arise, and the transportation system will develop new needs.

An analysis of existing conditions shows that the Roanoke County transportation system is currently in good shape and projects are funded, or have been recently constructed, to address the most

pressing current issues. The map on pages 6-74 and 6-75 shows all transportation projects in Roanoke County that are funded or have been constructed in the past two years. The table on pages 6-76 and 6-77 lists all projects in Roanoke County that are in the Fiscal Year 2024 VDOT Six-Year Improvement Program, the mechanism by which Commonwealth Transportation Board allocates funding to transportation projects over a six-year timeframe. Roanoke County's funded and recently constructed transportation projects will

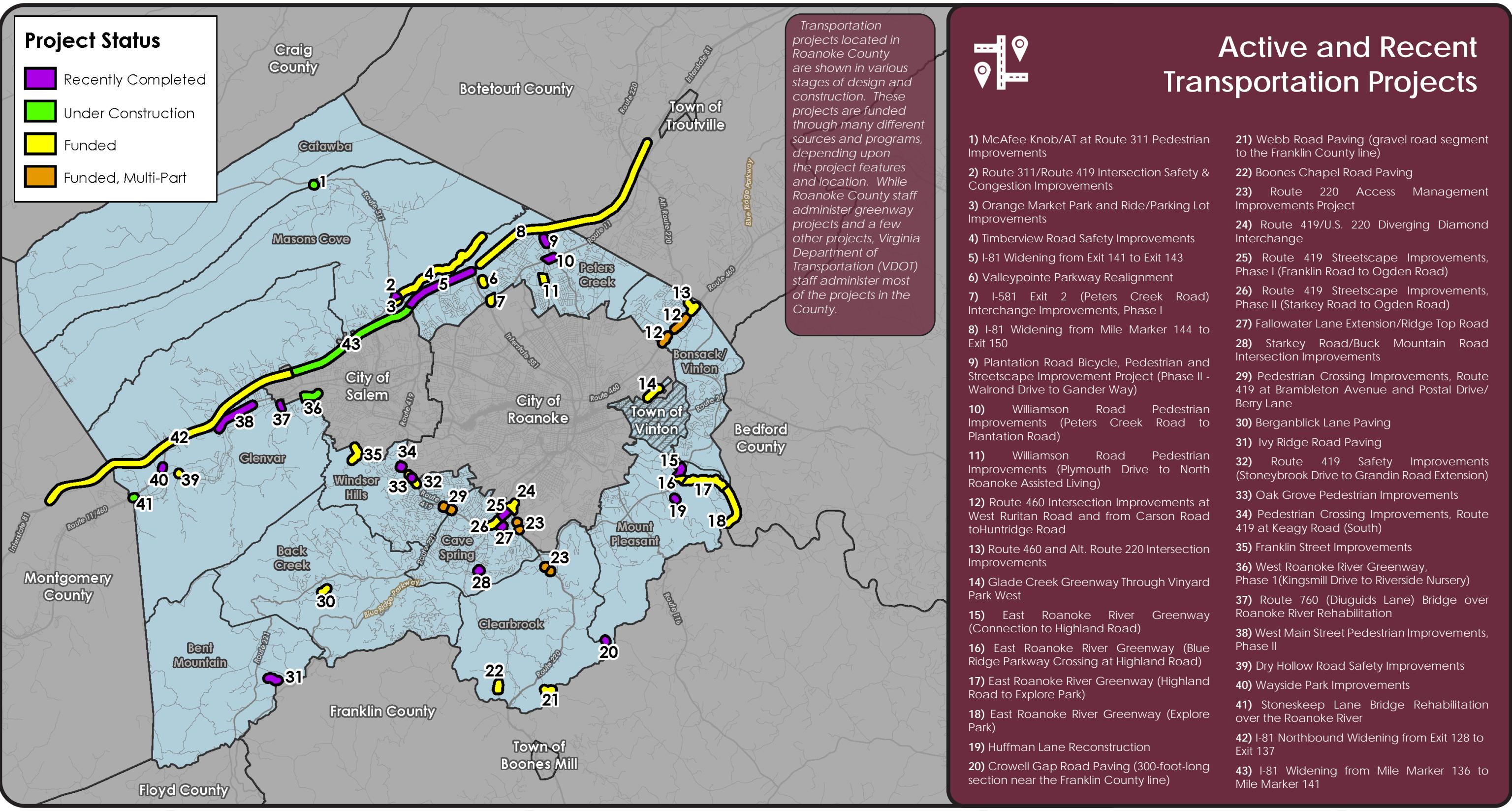
go a long way towards ensuring that the County's transportation system functions smoothly over the next fifteen years.

However, these projects will not address all the needs of, or challenges faced by, the Roanoke County transportation system over the next fifteen years. To keep the Roanoke County transportation system functioning smoothly in a constantly changing environment, Roanoke County must attempt to anticipate the ongoing, and future,

needs of the transportation system. The table on this page outlines what Roanoke County staff anticipate will be the most pressing needs of the county transportation system over the next fifteen years. Roanoke County's good working relationship with VDOT, the analysis of existing conditions, the summary of anticipated needs presented in this section, and the County's persistent pursuit of the projects recommended in Chapter 10 will prepare Roanoke County to face the transportation challenges of the next fifteen years.

Summary of Anticipated and Ongoing Roanoke County Transportation Needs

Roads	Bicycle & Pedestrian
Maintenance and upkeep	Maintenance and upkeep
Mitigation of safety issues as traffic volumes increase	Expansion of infrastructure
Mitigation of congestion as traffic volumes increase	Improved connectivity
Upgrades to, and coordination of, traffic signals	More routes that are separated from motor vehicle traffic
Repair or replacement of aging bridges	Greenways & Trails
Upgrades to bridges that are unable to support all emergency vehicles	Maintenance and upkeep
Additional tractor trailer parking	Expansion of infrastructure
Transit	Improved connectivity
Expansion of service to new areas and new days and times	Completion of the Roanoke River Greenway
Education and outreach about Roanoke County transit programs	Mitigation of heavy use of McAfee Knob and Dragon's Tooth trailheads
Rail	Air
Elimination of at-grade rail crossings that serve as the only way in and out of neighborhoods	Expansion of at least one runway
Establishment of safe crossings of the track that will be used for the Amtrak Christiansburg expansion	Development of infrastructure to accommodate new technologies like eVTOLs
Development of emergency evacuation routes for the Amtrak Christiansburg expansion	





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Roanoke County Projects in VDOT Six-Year Improvement Program

Updated 11-9-23

Project Name	UPC #	# on Roanoke County Transportation Projects Map	Project Name	UPC #	# on Roanoke County Transportation Projects Map
Berganblick Lane Paving	117235	30	Roanoke River Greenway (Explore Park)	113567	18
Boones Chapel Road Paving	T28048	22	Roanoke River Greenway (Highland Road to Explore Park)	110155	17
Dry Hollow Road Safety Improvements	107309	39	Route 220 Access Management Improvements Project	110887	23
Fallowater Lane Extension/Ridge Top Road	112304	27	Route 220 over Back Creek Bridge Replacement	82193	Not on Map - Completed Over Two Years Ago
Franklin Street Improvements	T25441	35	Route 311/Route 419 Intersection Safety & Congestion Improvements	108904	2
Glade Creek Greenway Through Vinyard Park West	122101	14	Route 419 Pedestrian Crossing improvements, Brambleton Avenue and Postal Drive	T27840	29
I-581 at Exit 2 (Peters Creek Road) Interchange Improvements, Phase 1	123136	7	Route 419 Safety Improvements, Stoneybrook Drive to Grandin Road Extension	T27847	32
I-81 Detour Signal Communication Improvements	118034	Not on Map - VDOT-Initiated Regional Project	Route 419 Streetscape Improvements, Phase I (Franklin Road to Ogden Road)	107061	25
I-81 Northbound Widening from Exit 128 to Exit 137	116197	42	Route 419 Streetscape Improvements, Phase II (Starkey Road to Ogden Road)	119462	26
I-81 Widening from Exit 141 to Exit 143	108906, 111373	5	Route 419/U.S. 220 Diverging Diamond Interchange	115460	24
I-81 Widening from Mile Marker 136 to Mile Marker 141	116203	43	Route 460 and Alt. Route 220 Intersection Improvements	120611	13
I-81 Widening from Mile Marker 144 to Exit 150	116201	8	Route 460 Intersection Improvements at West Ruritan Road and from Carson Road to Huntridge Road	122110	12
Ivy Ridge Road Paving	110958	31	Route 760 (Diuguids Lane) Bridge over Roanoke River Rehabilitation	110620	37
McAfee Knob/AT at Route 311 Pedestrian Improvements	111066	1	Starkey Road/Buck Mountain Road Intersection Improvements	113144	28
Oak Grove Pedestrian Improvements	122050	33	Stoneskeep Lane Bridge Rehabilitation over the Roanoke River	115473	41
Orange Market Park and Ride/Parking Lot Improvements	T24579	3	Timberview Road Safety Improvements	T26583	4
Pedestrian Crossing Improvements, Route 419 at Keagy Road (South)	117212	34	Valleypointe Parkway Realignment	119468	6
Plantation Road Bicycle, Pedestrian and Streetscape Improvement Project (Phase II - Walrond Dr to Gander Way)	111366	9	Webb Road Paving (gravel road segment to the Franklin County line)	110957	21
Project Pipeline Study: Peters Creek Road and Williamson Road (Wood Haven Road to Plantation Road)	123280	Not on Map - Study	West Main Street Pedestrian Improvements, Phase II	108882	38
Project Pipeline Study: Route 11/460 at Dow Hollow Road	123284	Not on Map - Study	West Roanoke River Greenway, Phase 1(Kingsmill Drive to Riverside Nursery)	97171	36
Project Pipeline Study: Route 419 from Bower Road to U.S. Route 11	119954	Not on Map - Study	Williamson Road Pedestrian Improvements (Peters Creek Rd to Plantation Rd)	111317	10
Roanoke River Greenway (Blue Ridge Parkway Crossing at Highland Road)	113356	16	Williamson Road Pedestrian Improvements (Plymouth Dr to North Roanoke Assisted Living)	113947	11
Roanoke River Greenway (Connection to Highland Road)	91191	15	Williamson Road/Peters Creek Road Pedestrian Improvements	107055	Not on Map - Completed Over Two Years Ago